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Correspondence regarding any topic of international trade interest is invited from readers of the Review and contributions on such subjects, if available for publication, will be paid for at space rates. Photographs of commercial scenes will be purchased, if suitable for reproduction. Manuscripts and photographs not used will be returned promptly if postage is sent for that purpose.

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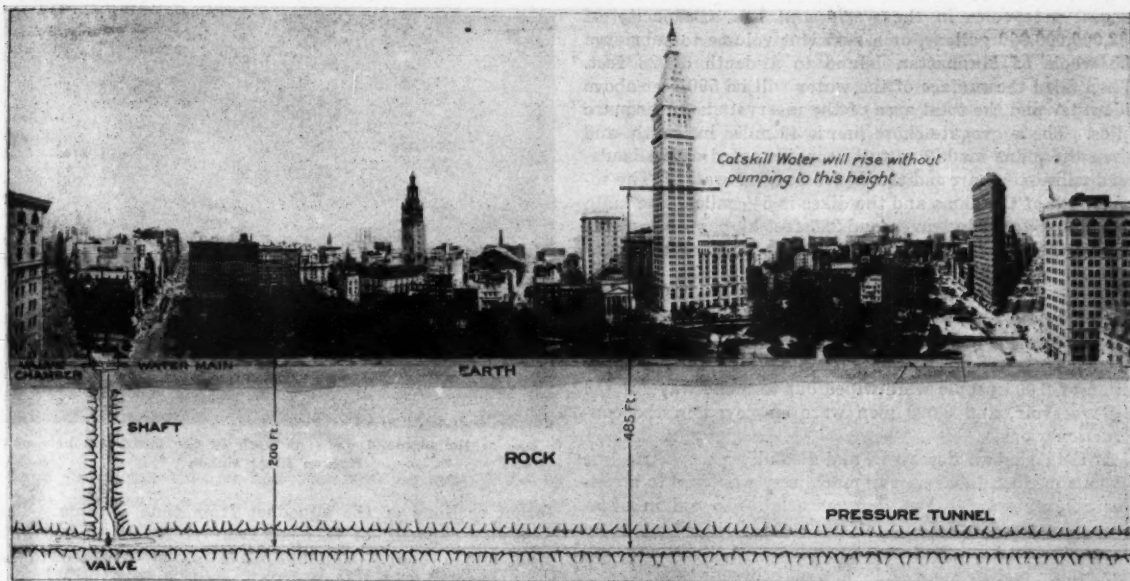
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Cross sectional view at Madison Square, New York, showing depth of pressure tunnel below the surface (485 feet) and the height to which Catskill water will rise in the Metropolitan Tower without pumping

BRINGING MOUNTAIN WATER TO THE CITY OF NEW YORK

The Catskill Watershed, 92 Miles Distant, Will Furnish 770,000,000 Gallons per Day, at an Expenditure of \$150,000,000

By John M. Lloyd, New York

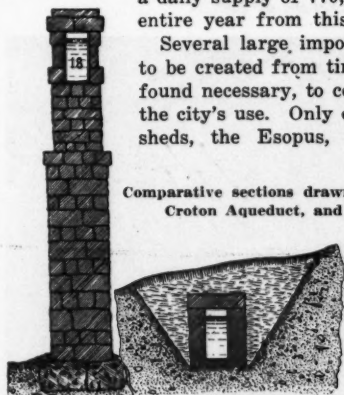
THE development of the Catskill Mountain watershed as a source of supply for New York City, is of interest because of the fact that it has presented one of the greatest problems of hydraulic construction that has ever been undertaken. In December of last year, water was admitted to the Ashokan Reservoir, which is the largest storage unit of the system, and this marks the beginning of the end of an undertaking that rivals in both magnitude and importance the Panama Canal, although it will, in all probability, be at least another year before the system is in operation. The new supply of water is drawn from four drainage areas, which are situated west of the Hudson River in the Catskill Mountains and are located in a sparsely-settled region from 75 to 135 miles from the center of the metropolis. In the aggregate the extent of these different watersheds amounts to approximately 900 square miles, if several small contiguous areas are included, the exact figure for the four districts being 747 square miles. It is estimated that even should a series of exceptionally dry years occur it will be possible to draw a daily supply of 770,000,000 gallons for an entire year from this gathering ground.

Several large, impounding reservoirs are to be created from time to time, as may be found necessary, to collect these waters for the city's use. Only one of the four watersheds, the Esopus, which is the second

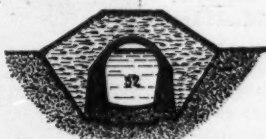
largest and has an area of 225 square miles, is being developed at the present time, but its only reservoir—which bears the Indian name of "Ashokan"—is to be by far the largest and most important of them all. From this reservoir the Catskill Aqueduct will convey the water into all five boroughs of the city. While this watershed cannot supply more than 250,000,000 gallons per day, the aqueduct for economic reasons, is being constructed with double that capacity.

From the Ashokan Reservoir, located as it is in the foothills of the Catskill Mountains, it takes almost three days for the water at the average rate of flow through the aqueduct to reach the Borough of Richmond—more widely known as Staten Island—at the southerly entrance to New York Harbor. In traversing this distance of 127 miles, the aqueduct skirts steep hillsides, pierces mountains, descends beneath deep rivers and wide valleys and crosses the Narrows of New York Harbor. From the Ashokan Reservoir to the northern boundary of the city, there are 92 miles of aqueduct. The principal sections of the system are the Ashokan Reservoir, the Catskill Aqueduct proper, the Kensico Reservoir, the Hillview Reservoir and the city distribution system.

The Ashokan Reservoir, into which water has been recently admitted, is about 14 miles west of the Hudson River and the total of the contract under which it was constructed amounts to nearly \$18,000,000. It is one of the



AQUA CLAUDIA



OLD CROTON

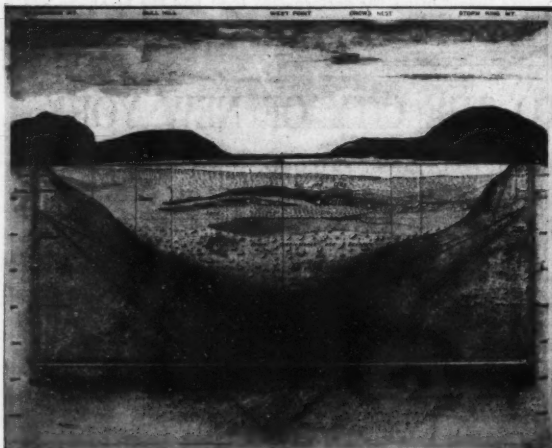


CATSKILL

Comparative sections drawn to scale of the Catskill Aqueduct, the Old Croton Aqueduct, and the Aqua Claudia built by the Romans

largest reservoirs in the world and has a capacity of 132,000,000,000 gallons, or a sufficient volume to submerge the whole of Manhattan Island to a depth of 28 feet. When filled the surface of the water will be 590 feet above tidewater and the total area of the reservoir is 12.8 square miles. The aggregate shore line is 40 miles in length, and when the plans made are fully consummated a fine boulevard will extend around the entire body of water. The total length of the dams and the dikes is 5½ miles. The main dam is 4,650 feet in length and 220 feet high, with a thickness at the base of 190 feet. The preliminary estimate for this contract called for 2,480,000 cubic yards of excavation of all kinds, 425,000 of rock excavation and 7,500,000 of embankment and refilling. The masonry of all classes totaled 882,000 cubic yards and required over 1,000,000 barrels of cement. Seven villages with a population of 2,000 people were wiped out to make way for the big reservoir, and 3,000 men were employed in the construction work.

At the Ashokan Reservoir, and also along the entire line of the aqueduct, labor-saving machinery was used to a considerable extent for handling material. To aid in excavating for the foundations of the dam and for building the masonry section, four traveling cableways were installed, each having a clear span of 1,530 feet, a lifting capacity of



The Hudson siphon, showing shafts and pressure tunnel and vertical and inclined borings

15 tons and a speed of 1,200 feet per minute. The cableway towers were about 90 feet high, running on tracks 600 feet long and arranged in three sets, one track of three rails and two of two rails each. The hoisting engines were on the towers on the north bank and were operated by compressed air from the powerhouse. The tail towers had engines which were used only to move the cableways along the tracks. These cableways were employed for handling in steel skips the immense stones used in the construction of the dam, although the actual setting was done by derricks. It is believed that the cyclopean masonry was deposited in this dam at a greater speed than was ever before attained. During the month of October, 1909, 33,182 cubic yards of masonry and 2,117 cubic yards of concrete blocks were set in 29 days. During 1909, 154,000 yards of masonry and 9,000 yards of blocks were placed and set, and in 1910, 175,000 yards of masonry and 27,000 yards of blocks were set. The last concrete block in the main dam was set March 2, 1911, so that in 27 working months 426,000 cubic yards of masonry, 7,000 yards of mass concrete and 56,000 yards of concrete blocks were set. The use of the cableways and the results accomplished are typical of the numerous other installations.

The Kensico Reservoir, east of the Hudson and 30 miles from the New York city hall, will contain two months' supply of Catskill water at the maximum draft. It will thus serve to tide the city over any emergency that might be caused by a break in the aqueduct above this point and will also enable inspection and repairs to be made on dif-



One of the diamond drills at work in the horizontal hole at Hudson River siphon

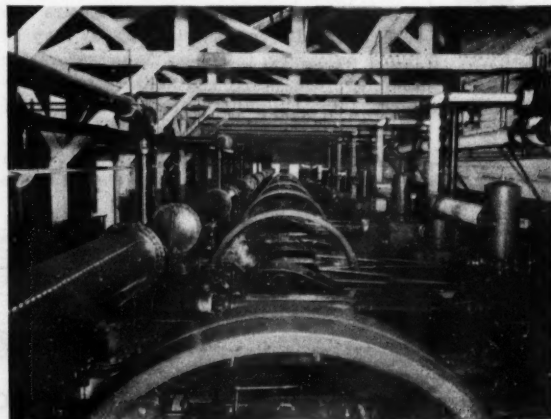
ferent sections of the aqueduct from time to time. The available capacity of this reservoir is 29,000,000,000 gallons, and a nearly constant elevation is expected to be maintained. The Kensico Reservoir is now being constructed under a contract amounting to almost \$8,500,000 and is scheduled for completion in 1920, it being possible to by-pass this reservoir at will. It is on the direct line of the aqueduct and will be the main distributing point in the more distant future for the whole metropolitan district.

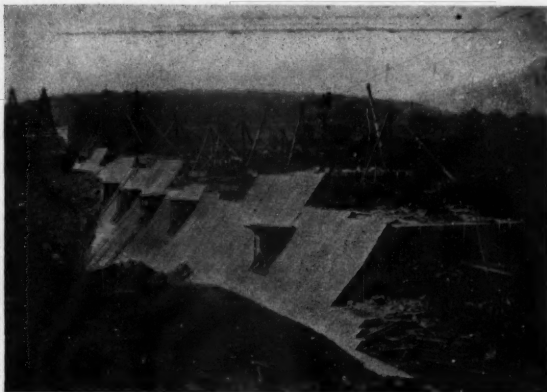
The Hillview Reservoir is located just over the New York City line and is 15 miles south of the Kensico Reservoir. Its function will be to equalize the difference between the use of the water in the city as it varies from hour to hour by maintaining a steady flow in the aqueduct. From this reservoir it will be possible to furnish large quantities of water on short notice, as in the case of a great conflagration.

The Catskill Aqueduct north of the city line is composed of four distinct types of conduit construction, cut-and-cover, grade tunnel, pressure tunnel and steel pipe siphon. The first type forms 55 miles of the aqueduct and is of horseshoe cross-section 17 feet high and 17½ feet wide. It is constructed of concrete and as completed it is covered with earth embankment. This is the least expensive type and is used wherever the elevation and nature of the land will permit.

In connection with the cut-and-cover sections, extensive use was made of collapsible steel forms which also telescoped. The outside form consisted of steel panels composed of ½-inch plates braced by heavy ribs and horizontal angles dividing these sections into small stiff units. The inside forms were jointed in three places and were intended to be used telescoping. The inside forms were at first collapsed and moved on a wooden A-frame operated by

The air compressor plant at power-house of Rondout siphon, Esopus division



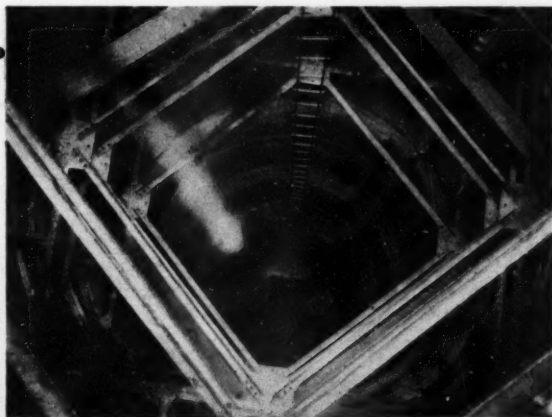


Downstream face of masonry section of Olive Bridge dam in course of construction

hand jacks, but this method was later on supplanted by three electrically operated carriages. The latter greatly facilitated the moving of the forms and by their use it was possible for a few men to collapse and set up in a new position approximately 60 feet of forms in an 8-hour day.

A number of traveling concrete plants were also used on these sections of the work. One of them, which was typical of practically all the rest, was a three-story steel structure built on two steel cars 60 feet long, bolted together side by side. A revolving electric crane with a 40-foot boom was fastened on the upper deck of this traveler and served to lift the concrete materials from cars running on a track alongside to the various bins and platforms. Skips of stone were dumped on one of these platforms and fed into a crusher from which it was raised by a bucket elevator to a revolving screen. Material rejected by this screen was again crushed and eventually found its way to the sand bin. Natural sand was used to a minimum amount of 50 per cent. and was delivered directly by buckets. Underneath the stone and sand bins were located the measuring hoppers of the concrete mixers. A special steel bridge having a span of 140 feet was pivoted from the rear end of the traveler and rested on a small steel tower, which was mounted on wheels running on a track supported by steel saddles made to fit the top of the arch. Attached to the lower chord of the bridge was an I-beam upon which an electric telfer was operated. This telfer contained a little car in which the operator was seated. He operated an electric hoist which raised and lowered the concrete buckets charged from the mixer. These buckets were run directly over the forms by the operator and dumped by men standing on the forms who placed and spaded the concrete. The aim of the designer of this plant was to produce a self-contained traveling concrete plant which could not only mix the concrete, but could also crush the stone and make sand and in addition move the outside

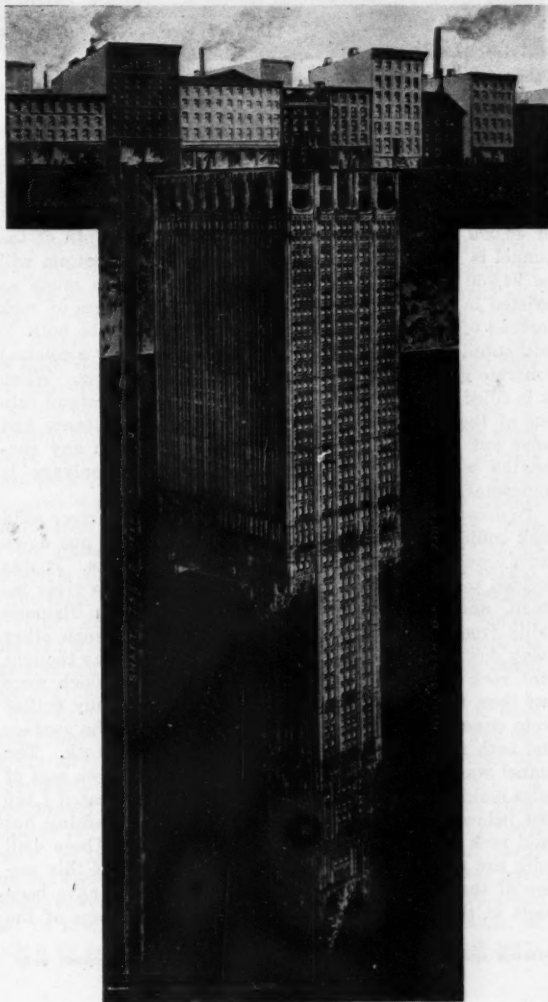
Looking down a shaft of the city tunnel, showing concrete of caisson and inside forms



forms. A traveler, operated by a chain hoist, was erected on top of the bridge for this last operation.

Where hills or mountains cross the line and it would be impracticable to circumvent them, tunnels are driven through them at the natural elevation of the aqueduct. There are 24 of these grade tunnels in all, with an aggregate length of 14 miles. They are also of horseshoe shape, 17 feet high and 13 feet wide, and are lined with concrete throughout.

For crossing broad and deep valleys, where there is suitable rock beneath them, circular tunnels are driven deep in the rock and lined with concrete. There are seven pressure tunnels, totaling 17 miles, with a diameter of approximately 14 feet. A shaft at each extremity connects the pressure tunnels with the adjacent portions of the aque-



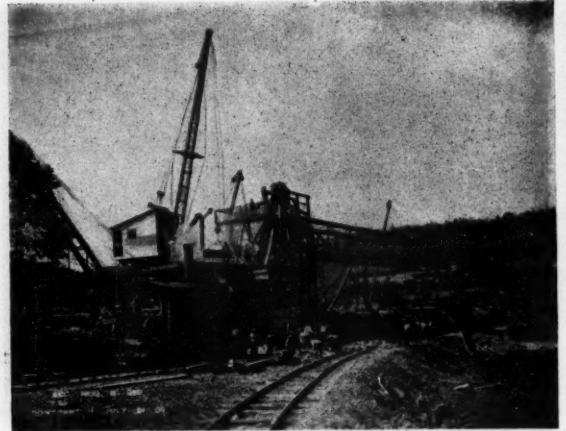
From Scientific American

City tunnel with Woolworth Building inverted, its apex just reaching tunnel level

duct. The largest of these tunnels, which is the one under the Hudson River, consists of two vertical shafts 14 feet in diameter and about 900 feet deep, and a 14-foot circular tunnel over 3,000 feet long through solid rock under the river, 1,100 feet below mean high water. Although referred to almost exclusively as the Hudson River siphon, this is not scientifically correct, as it is technically an inverted siphon. In reality it is a mighty tunnel driven in rock nearly a quarter of a mile below the surface of the water and capable of delivering enough water in a single day to fill 2,333,333 miles of ordinary garden hose. The siphon is shaped like a letter U which some Titan might have traced, for its legs or shafts are as long as two tall skyscrapers, placed one on top of the other, and the cross-



Marion shovel, Model 25, with short boom and dipper handle at work in 14-foot tunnel



Traveling concrete crushing, mixing and form-moving plant at work on a cut-and-cover section

bar covers a distance of approximately fifteen city blocks. It is the deepest waterworks pressure tunnel in the world at the present time. The Catskill water supply will be fed into the mouth of this monster tube under a pressure of 44,000 pounds per square foot, and as the depth of the tunnel is 1,100 feet, the static pressure at the bottom will be 94,260 pounds per square foot; probably as much as existed in the primitive cannon which fired pieces of rock instead of steel projectiles. The siphon had to be built to withstand great bursting stress, and is in reality a colossal concrete gun loaded with water instead of powder. When it is filled with water no diver could hope to descend into one of the shafts more than one-fifth of the distance and come out alive, for the greatest depth at which any submarine worker has accomplished any useful salvage is somewhat less than 200 feet.

To determine how far below the bottom of the river solid rock could be found vertical borings were first put down from scows anchored in the river without success. It was decided to attack the work from the sides of the river instead, and inclined borings were started with diamond drills from each shore pointed so as to cross each other away down underneath the Hudson, where it was thought that rock existed. Two pairs of these holes, which were less than two inches in diameter, were successfully drilled from chambers in shafts about 300 feet below the surface and both sets of borings crossed in solid ledge rock. The tunnel was located between the bottoms of the two sets of holes making it certain that if the siphon was located 1,100 feet below the surface of the Hudson River, nothing but solid rock would be encountered in driving it. These drill holes are one of the most interesting features of this section of the aqueduct. Although longer borings have been made at the South African gold fields and in some of the

mining regions in the West, their lengths, 2,051.6 and 1,651.4 feet, respectively, render them unique in this part of the United States. The holes were made by a cutting bit of hollow steel having a ring of costly black diamonds set in its lower edge. The bit is several inches in diameter and is rotated through a long line of rods by an engine driven by compressed air. The diamonds cut out a small circular ring in the rock leaving a core of rock at the center. This passes up through the hollow bit as the drill eats its way downward and is held fast by a device known as the core lifter which grips the slender column of rock and permits it to be brought to the surface for examination.

Apart from the depth of the shafts, no particular trouble was experienced in constructing the siphon. The work of tunneling under the river, begun on June 22, 1911, was prosecuted from both sides, and on January 30, 1912, the shot was fired which broke down the rock wall separating the two tunnels. The record shaft sinking for the country was done on the shaft on the east bank of the river. Between March 8, and April 8, 1911, no work being done on Sundays, 183 feet of shaft was excavated, and a total depth of 588 feet was sunk in 93 working days, or 6.1-3 feet per day. Another interesting feature about this shaft was the installation of cable guides instead of the usual timber guides attached to the concrete lining of circular shafts for the operation of cages. A single cage was installed and operated in wire guides attached to the head-frame and to anchor bolts at the bottom of the shaft. The guides were of galvanized wire rope $1\frac{1}{4}$ inches in diameter which passed over sheaves in the head-frame and were attached to it by two steamboat ratchets used to take up slack.

The steel pipe siphons are used in valleys where the rock is not sound or where, for other reasons, the pressure

Marion special 4-yard shovel at work on Catskill Aqueduct near Walden, N. Y.



Cement guns placing cement outer lining on top of pipe covering on cut-and-cover section





Bucyrus steam shovel excavating site of dam at the Kensico Reservoir, Valhalla, N. Y. Steam shovels were as extensively employed on the Catskill Aqueduct as at Panama

tunnels would be impracticable. These steel pipes are made of plates from $\frac{3}{4}$ to 7-16 inches in thickness, riveted together, and are made in two sizes of 9 and 11 feet in diameter. They are lined with two inches of cement mortar, are imbedded in concrete and then covered with an earth embankment. There are 14 of these siphons, with an aggregate length of six miles. Three pipes are required at each siphon for the full capacity of the aqueduct, but only one is needed at the present time.

At the Ashokan and Kensico reservoirs aerators capable of treating all the water that will flow in the aqueduct are being built. These two aerators are substantially alike, and are great fountain basins approximately 500 feet long and 250 wide, each containing about 1,800 nozzles through which jets of water will be thrown vertically into the air. The nozzles are so designed that the water will be divided into fine sprays, thus permitting the thorough admixture of oxygen and the removal of undesirable gases and matter causing tastes and odors. The jets will be so arranged as to be pleasing in appearance, and it is said that the fountains will be well worth visiting when in operation.

At first it was not intended to filter the Catskill water, but provision has been made for a filtration plant having an area of 315 acres. This is located close to the line of the aqueduct about two miles below the Kensico Reservoir, where a connection chamber is being built in the aqueduct so that in the future water can be diverted to and received back from the filter plant.

From the Hillview Reservoir the water will be delivered to the five boroughs of the city by a circular tunnel in solid rock, the diameter of which gradually decreases from 15 to 11 feet. From the two terminal shafts in Brooklyn, steel and iron pipe lines will be laid to connect with the outlying boroughs of Queens and Richmond. A flexible-jointed cast-iron pipe 10,000 feet long, laid in a maximum depth of water of about 60 feet and subjected to a current of more than 3 miles per hour, with short intervals of quiet between tides, will cross the Narrows to the Silver

Lake Reservoir on Staten Island, holding 400,000,000 gallons. The total length of this distribution system is 34 miles. The tunnel will be at a depth of from 200 to 750 feet below the street surface, thus avoiding interference with street building, subways and sewers and furnishing a sufficient depth to insure a substantial rock cover to withstand bursting pressure. The tunnel is being constructed from 24 shafts located about 4,000 feet apart in parks and other places where they interfere very little with traffic. The tunnel and shafts are being lined with concrete and the latter will be utilized to deliver the water through gate and pressure regulating valves to the city mains.

Steam shovels also played an important part in the excavation work of all sections. On one portion of the work where careful records of the performance of the shovels were kept it was found that from 300 to 830 cubic yards of earth was removed per 8-hour shift, and 100 to 500 cubic yards of rock were removed in the same time. One of the shovels averaged 354 cubic yards per shift in all materials and another 366 cubic yards in the same period. While these records are much below the usual performance of steam shovels under favorable conditions, the results obtained were very good when the narrow trenches and the variable materials in which the shovels worked are taken into account.

The work of constructing the aqueduct could not have been prosecuted without the use of compressed air and one of the largest air compressor plants ever constructed for a contractor was installed on one portion of the work. A preliminary study indicated that at this particular point some 26,200 cubic feet of free air compressed to 100 pounds would be required every minute. To supply this large amount eight 421-horsepower and two 300-horsepower compressors were installed, having a capacity of 22,600 cubic feet of free air per minute compressed to 110 pounds, or with a 25 per cent. overload, 28,250 cubic feet. This plant

(Concluded on page 80)

Four Lidgerwood traveling cableways placing material on the Olive Bridge dam of the Ashokan Reservoir. Each cableway has a span of 1,534 feet





The Cathedral Plaza, Panama City, a popular promenade at all hours of the day, and especially during the evening.

BUILDING A NEW PANAMA CITY

Central Avenue Likely to be Rebuilt, Many New Government Palaces Projected, and a New Residential Section in Course of Construction

By C. T. Mason, New York—Illustrated from Photos Loaned by E. A. Drake, Vice-President of the Panama Railroad Company

WHAT will be the future of Panama City now that the Canal has been virtually completed? This is the question which the leading natives of the Republic—and with them many English, Germans and Americans—are asking. The consensus of opinion, if one may judge by the average conversation, seems highly optimistic as to the future. Commercially, when the city has had time to recover from the present reaction after abnormal conditions, it is expected to be a flourishing place of trade. As the great gateway to the Pacific—just as old Panama was to Peru—it should take an important rank in the markets of the West. The commerce passing through it is bound, so many think, to influence the fortunes of the present city. Balboa, the new port, will not, as some merchants formerly feared, detract in any way from the commercial prospects of Panama. The docks will be there, and at that point passengers will disembark; but that will be all; Balboa is hardly likely to prove a business rival to Panama City. Trade will remain at the older city because there is everything ready prepared for it. So certain of this are the majority that, instead of thinking now about removing to Balboa, nearly every merchant is looking forward to enlarging his facilities at the old location.

One of the reasons for this optimism is the fact that as a free port, such as it has been decided to make it, the city must reap the benefits that are common to all places of the kind. It will become a distributing point for American and European houses—especially the latter—whose goods, forwarded here in bulk and warehoused not only at Balboa, but in Panama City, will, as demand requires, be

re-shipped to the individual markets along the Coast or to China and the Philippines. This, as will readily be imagined, will make Panama a most important trading point, not immediately perhaps, but as the business of the Canal develops.

A more positive sign, however, and one that no visitor can fail to notice, is to be found in the building operations now actually in progress, or which are planned for the near future. New houses are being put up and new places of business erected. Indeed, it seems only a matter of time when Central Avenue, the principal artery of the town, will be rebuilt from the railroad station to the Plaza, the ancient houses—some picturesque in their Spanish architecture, but others exceedingly unsightly—making way for successors of a more modern order. Already are there signs of this improvement of the avenue in the recently constructed Hotel Continental, the Royal Mail Building, at the corner near the railroad depot, and one or two other buildings in the vicinity of the square. With such a remodeling of the street, and a better grading of the uneven sidewalks, the avenue, along which the tramway now runs, should become one of the most striking thoroughfares in Central America and the busiest. One feature that already lends distinction to it, and which is a credit to its architects, is the new railroad station so advantageously located in the Plaza where the avenue begins.

Still another index of the future when the city, more commercially important, will be better equipped architecturally, is the permanent nature of the buildings (now

North Avenue, Panama City, before and after paving—apart from the manifest improvement from the standpoints of transportation and sanitation, the very houses and people have a more prosperous appearance





Both the plaza itself and all of the streets leading out from it are now well paved, as the illustrations show

in active course of construction) that will house the exhibits of the approaching fair. Located on an admirable site, with a beautiful prospect of the bay, it is safe to predict that these buildings will add intrinsically to the appearance of the city as a whole, and particularly to that section of it where most of the building operations of the future will be carried out. For it is not towards Balboa, so much as towards old Panama that the city will grow, and this, as some suppose, until the center of the town—now in the neighborhood of the Plaza—will be the railroad station and the little square upon which it faces.

Yet another sign, which cannot be overlooked as indicative of the spirit of optimism, is the fact that certain real estate concerns have conceived the addition of an entirely new residential section to the city. These operators, one of which is an English concern with a capital of £50,000, have acquired such land as seems best suited to their purpose, a portion of the suburbs lying partly in the Zone and partly out of it, on the way towards old Panama and near the junction of the road to Cruces. Washed on one side by the waters of the bay and facing upon the really fine road to old Panama, this is indeed an admirable site for a suburban offshoot to the town and for residences of the kind it is proposed to erect.

Here the air is breezier at all hours and the temperature more supportable in the torrid months of summer than in the close streets of the city and along the old waterfront, where antiquated dwellings overlook the mirror-like surface of the bay. Also there will be, as in all such suburban properties, plenty of green grass to refresh the eye, and trees for shading and ornamental purposes along the streets. These last are to be broad, macadamized, with sidewalks, curbs, sewerage, water mains and electric lighting—all the advantages, in fact, of an American suburban section.

The older of these two companies, created some three years ago, has already begun the improvement of its property, of which already some 200 lots have been sold. Placed on the market a year and a half ago at the price of \$1

the square meter, at which 110 lots were sold in less than a fortnight, the price to-day has advanced to \$3 and \$4 per square meter, according to locations. Some of these purchases were for cash, but many, to those of smaller means, were made on instalment terms, varying from 18 months to a maximum of three years or so. All deeds are free and clear to the purchasers, but, as is desirable in all such property, there are restriction clauses preventing the erection of manufacturing establishments, storage houses, shops, etc., except on lots set apart for such purposes by the company. The size and cost of residences, varying from eight rooms at \$2,500 on the principal avenues, to three rooms at \$900 on less desirable streets, are also indicated in the purchase contract. As a further attraction to the property, as originally surveyed, a considerable space was reserved for an amusement park, but this, at least for the present, has been abandoned, as has also the site at first proposed for a modern hotel such as the city may need at no very distant period. The other company has recently entered the field, its property having an area of 200 acres. The same improvements are to be carried out, and somewhat similar terms will also be made to the public. The company, however, unlike its older competitor, proposes to build for its customers, should they so desire, on the instalment plan, with a first and second mortgage security.

As another instance of the certain growth of the city, and that in the direction indicated, it must be mentioned that the Government, having decided to construct a modern hospital in place of the present one of Santo Tomas, has definitely decided to do so on land adjacent to the exposition grounds, but sufficiently removed from the noise of traffic and exposition affairs as to ensure the desired quiet for the inmates. This building, already entrusted to capable hands, will add its share to the appearance of that section of the city; as will also the Asilo Bolivar, or national almshouse, which it is proposed to remove to that vicinity, and for which a new and commodious building, worthy of the new Panama, will be erected shortly.

Officers' quarters at Ancon Hill, showing typical style of architecture for private residences of the better class, which experience has shown to be best adapted to meet the conditions that exist at Panama





Jacob Doll & Sons.

"Electrova" Style No. 66, a coin operated attachment 88-note player piano with electro-pneumatic action



Jacob Doll & Sons.

Player piano Style No. 58, manufactured by Jacob Doll & Sons—can be had with electric motor

THE MODERN PLAYER-PIANO

The Mechanically Operated Piano has now Won Recognition in Every Part of the World and in all Classes of Society

By Norman H. Schneider, New York

ONE of the quickest and surest ways to make money is to give the public a form of entertainment combining the widest appeal with the least mental effort. Music, and particularly that of the piano, has long met the first condition, but not until recently has it been the privilege of anyone desirous of playing the piano to be able to do so without going through a long technical training.

The modern player-piano may be said to have opened the royal road to learning in so far as piano music is concerned. Anyone of ordinary intelligence, even a small child, can operate a player-piano and produce good music. Yet its strongest appeal lies in the fact that not only will it play any kind of music without previous study, but it admits of the performer exercising his or her individuality in the rendering of the selection.

The modern player-piano may be operated automatically by electrical means; may be operated by a person blindly following the simple marks appearing on the moving strip of perforated paper which controls the mechanism, or even by merely pumping the pedals; and it may be artistically performed by one of musical tastes, with or without

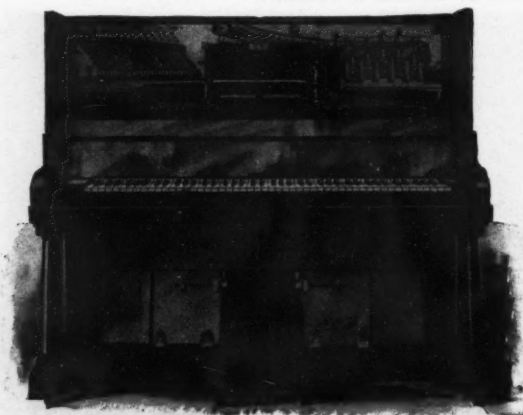
technical training in piano music. It admits of a mechanical but distinctly pleasing performance by the tyro or the finished effort of the artist, as one wills, on the same instrument. The wonderful success of the player-piano is largely due to this versatility; it satisfies all.

The player-piano of to-day is a thoroughly well-built instrument, designed to give perfect musical results, and is mechanically excellent. Its workmanship and material make it suitable for practically all climates, its care and upkeep are little more than for any ordinary piano. As an additional advantage to those who have learned to play a piano themselves, the player-pianos are instantly adaptable for such use. The player mechanism does not interfere with the use of the keys. It may be played by the paper roll or by hand.

The principles of operation in the player-piano are simple and easily understood. Anyone who has seen a piano played knows that the striking of the fingers on the white or black keys causes felt hammers to strike the musical strings, and produce the sound. In the player-piano mechanical fingers operated by suction or com-

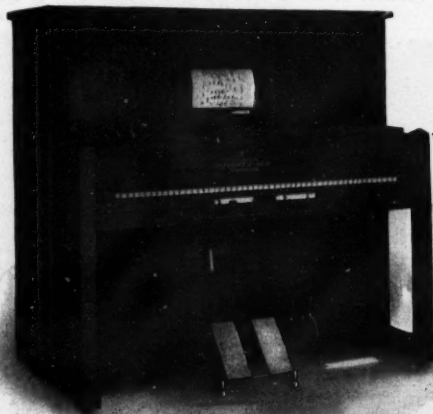
Sectional illustration showing the operative mechanism of a player piano

Gordon & Sons.



Grand upright 88-note player piano in handsome mahogany case—solidly constructed and durable

Gordon & Sons.





Jacob Doll & Sons.

The tempo indicator of a modern player piano—the time-controlling device

pressed air take the place of the human fingers. Briefly, the general operations is as follows:

At a convenient point near the hammers which strike the strings lie rows of small bellows, there being one or more for each hammer. These bellows are normally in a state of expansion and are connected through tubes and valves to a long row of holes in the edge of a bar called the tracker bar over which travels a wide strip of perforated paper. So long as the paper is uncut and covers all the holes in the bar nothing happens as it winds along, but when a hole in the paper corresponds with a hole in the bar, air sucked in that hole darts down the corresponding tube and operates a valve, which in turn releases the air in the bellows attached to it. This bellows collapses and strikes the hammer, which in turn strikes the string, thus sounding one note.

It will be easily seen then that when holes in the paper successively uncover holes in the bar, the operating of the bellows and hammers produce a tune dependent upon which holes are being uncovered. One hole at a time in the traveling paper will give a melody, a number at one time sound a chord.

In actual detail the different makes of instruments vary, but fundamentally the principle is the same. One fact should be noted, that although the mechanism of a player-piano is at first glance complicated, it is only the duplication of parts necessary to operate perhaps eighty-eight separate hammers and their corresponding strings that gives this impression. In reality, for the effects produced, the modern player-piano is singularly free from complication.

The operation of the air pumps or feeder bellows is generally by means of treadles worked by the feet of the performer. In some instruments, expression—that is, loud

A plain but handsomely designed player piano made in mahogany and oak

The Laffargue Co.



Jacob Doll & Sons.

Illustration showing proper method of inserting the roll of music

or soft playing—is purely automatic; in others it is controlled by the performer, who watches marks on the roll and controls the air pressure; in still others it is obtained through the pressure of the feet on the treadles.

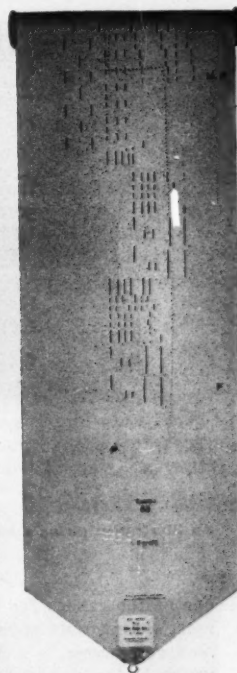
Electrically operated pianos have their bellows worked by a motor. These instruments are for the most part coin-controlled, being started by the inserting of a piece of money in the slot of an electric controller.

The commercial side of the player-piano presents excellent business opportunities to the enterprising dealer. Although thousands of instruments have been sold, not even a small fraction of the field has been covered. Every household, every place of amusement, every cafe, every place where refreshments are served is a prospective buyer.

The player-piano in the home meets a want that no other instrument can fill. It is but a matter of time, and short at that, when the majority of the ordinary pianos will be replaced by player-pianos or be converted into self-playing instruments. The dancing teacher and the ballroom proprietor are installing them with little solicitation, they are a good investment, bringing steady returns. Schools are using player-pianos for musical drills and assemblies, motion picture houses for filling in during intermissions and even as substitutes for orchestras. The returns from coin-operated pianos located in public places are normally larger. A dancing craze makes such devices gold mines for their proprietors.

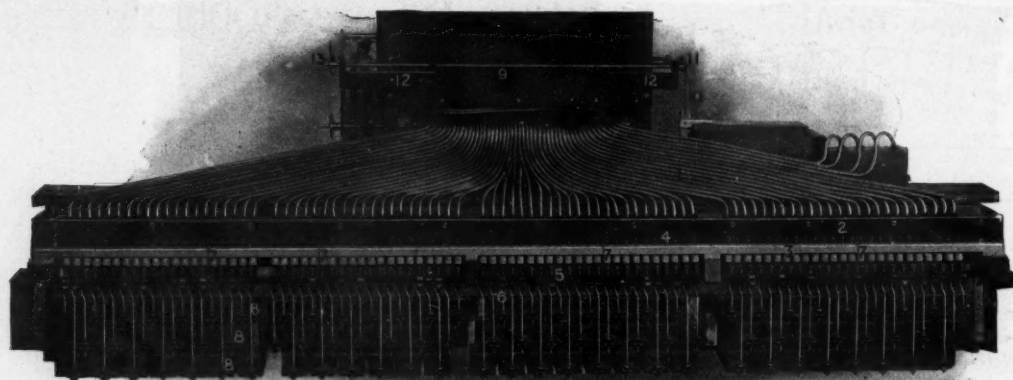
One of the remarkable facts about the player-piano is the hold it has taken on the masculine nature. Music, especially piano music, has long been associated with woman. Ever since the perfecting of the piano from the early forms of harpsichords, it has been the home instrument for the girl to learn to play, its study forming one of the fundamentals of a girl's education. The player-piano, however, is making a world-wide appeal to the grown man, and for several reasons. Very few men are without a love for music, latent perhaps, but none the less strong. The player-piano not only enables him to make music himself without outside aid, but it pleases at the same time his sense of tune and his sense of recreation. There is a fascination in the operation of the expression devices, the watching of the marks as they appear on the roll of perforated paper, the injection of his individuality into the rendering of a piece. Even the activity involved in pumping the pedals counts. It calls for action, alertness, the use of hands, feet and, in a limited sense, brain, and fosters a man's reliance upon himself for amusement at such time as he feels its need.

The popularity of the player-piano among men is



Jacob Doll & Sons.

Player piano music partially unrolled



Gordon & Sons.

An illustration giving a rear view of the top section and showing the metal tubes, regulating buttons and striking fingers of a player piano, the principal parts of the mechanism

one of the causes for its large sales fully as much if not more than for its appeal to the feminine element. Once a man gets access to a player-piano he falls under its spell, which to the dealer means business of the best kind, for man requires and knows a good article and generally wants the best he can afford. It is safe to say that the greater number of music rolls are sold to men. The money spend for man's recreation is unstinted and particularly so when that recreation satisfies the entire household.

An important aid to the selling of player-pianos, and particularly of music rolls, is playing them at all favorable times. The active dealer who keeps his instruments going by the playing over of new or favorite rolls is sure of an interested audience, mostly potential buyers. It is well known that many persons hesitate to ask even for something they want.

The greater number of pianos played by these semi-automatic means have the mechanism built in, or forming an integral part of the instrument itself. Several of the player attachments, however, can be applied to any piano at a moderate expense, the mechanism not requiring any alteration in the piano, or in any way limiting its use as a finger-played instrument.

One type of electrically controlled player has the perforated music roll and the various expression levers, or controlling appliances contained in a separate and portable small case, which is connected to the mechanism in the piano by a flexible electric cable. This method of control permits the piano itself to be located anywhere convenient, but to be played from a distant point. For special purposes, such as in amusement resorts, cafes and similar public places, there are pianos which have combined in them violin or flute solo tones. These instruments may

be played by hand or by the roll, with or without the orchestral tones.

A storekeeper who never displayed his goods, but kept them put away, would sell little, even if his would-be customers knew what the stock was. Not only does the sight tempt, but it often leads to a sale, whereas if the buyers had to go into the store and ask for the articles, many persons would do without all but necessities, from this very curious shyness, which is more common than is often realized. Where the music roll is being played, not only does it attract, but it gives courage to the shy buyer to ask for it.

The sale of a player-piano in itself is profitable, but the future business in new rolls is continuously profitable. Once the instrument is installed, the demand for rolls can be counted on indefinitely. Naturally, at times a little stimulation may become necessary. A follow-up system is valuable whereby each purchaser is kept reminded of new music, or where rolls are sent without solicitation for limited trial. In some large cities, libraries of rolls are maintained for the loan of new music, but even these stimulate purchasers, many a piece loaned in this way has brought repeated purchase orders. The fundamental object of having a player-piano is to be independent of outside help. A roll that has made a hit in the library is generally out, and to own it for oneself is the first instinct of human nature. Many dealers loan rolls for a small fee, for the same reasons cited above these loans lead to purchases.

There is no intricate salesmanship needed to make a player-piano business a success. A moderate capital and some energy suffice for the instrument practically advertises itself and little effort is necessary to effect a sale.

View of a keyboard showing the various levers by which a player piano is controlled. They are easily understood and not liable to get out of order

Gordon & Sons.



WEALTH FROM WASTE AND BY-PRODUCTS

A Few of the Many Ways in which Modern Science has Contributed to the Utilization of Products Formerly Thrown Away

By Thaddeus S. Dayton, New York City

IN fairy tales a touch of the magic wand turns pumpkins into royal coaches, rags into regal raiment, dross into gold. The industrial chemist and the engineer are the magicians of to-day. They are accomplishing things far more wonderful than ever were imagined for storybooks. The things that our forefathers threw away are now transformed into sources of vast wealth. Nothing is wasted that science has discovered how to utilize. This is the era of by-products, of industrial thrift. The twentieth century is learning that it is the small economies that bring in the huge returns, and that the gigantic wastes of a generation ago made profits smaller than they should have been.

"Dirt," said Lord Palmerson, "is merely matter in the wrong place." The black, noisome ooze that goes by the name of coal tar is about as offensive to sight and smell as anything that can be imagined. Yet from it innumerable things to delight and minister to the sense have been evolved by the wizards of chemistry. New coal tar derivatives are being discovered almost every day. Many rich industries are based on the utilization of this once despised by-product. It yields dyes that excel in brilliant variety the hues of the rainbow and that are numbered by thousands. They have driven natural dyestuffs almost out of the market.

For instance, indigo is a picturesque plant that spreads its bloom in the remote fields of the Orient and in Central America. For centuries it was the basis of commercial wealth which the gentlemen adventurers of England sought in the heart of Hindustan. But to-day, although the indigo plant still flowers in the tropics, the cold countries of the northern latitudes are the greatest producers of this wonderful dye. In Germany and the United States, where there is an unlimited supply of coal tar, indigo is manufactured to the value of many millions of dollars a year and exported to every corner of the globe. Chemistry has found a way of "growing" indigo in the factory, and the world is that much richer.

To a German firm belongs the credit for the discovery of artificial indigo. The quest occupied some 35 years and cost about \$5,000,000. But the result was an indigo dye that was the exact chemical duplicate of the dye which nature, for ages, had been tediously manufacturing in her open-air laboratory under the tropical sun. The indigo fields of India now grow all kinds of vegetables and grains for food.

Every time a chemist discovers a new use for a waste product he takes a burden off the earth. Saccharin, six

are yielded by this Proteus of by-products. Perfumes, as exquisite as any in nature and indistinguishable from those of flowers, are extracted from this viscid, ill-smelling substance. A host of artificial flavors—duplicates of extracts—are separated from it also. It provides us with naphtha, a useful solvent of gums, resins, gutta percha and fats; with light and heavy oils; with pitch, which is utilized in road-making and in the making of varnish and roofing felt; and with naphthaline, which in itself is the source of many dyes. Thus coal tar, once a thing abhorred and hard to get rid of—"matter in the wrong place"—has become a palette of gorgeous colors, a medicine chest of potent healing, a vial of delicious flavors and soothing narcotics,



General view of a Semet-Solvay plant for the recovery of by-products from coke ovens

a garden of exquisite perfumes, and many other things besides

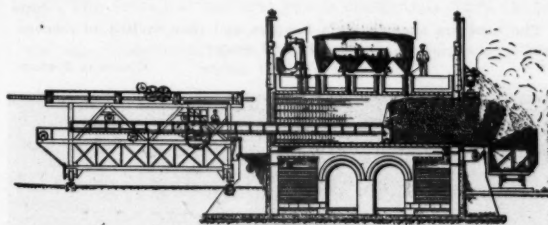
One day a chemist was passing a yarn mill and saw hundreds—thousands—of gallons of soapuds going to waste. To the industrial chemist waste is a crime, a deadly sin. The sight of these soapuds being thrown away was so painful to this particular chemist that he devised a method by which he precipitated the soapuds with lime, pressed them into briquettes, and from these produced a gas of three times the illuminating power of ordinary gas. With this gas he lighted the mill. To-day yarn mills save their soapuds for illuminating purposes.

Cyanide of potassium is a chemical that is used by thousands of tons for the refining of gold ores. The cyanide process extracts practically every pennyworth of the precious metal. It has added untold millions to the golden wealth of the world. Here are some of the ingredients from which cyanide is manufactured: horn, charred horn, dried ox-blood, woolen rags, sheep's wool, the hair of oxen, pig's bristles, scrap iron, ashes, old shoes, waste feathers and leather cuttings.

Because iron and copper are easily distinguishable in the earth, these metals have been used very generally from the dawn of time. Some years ago the eye of chemistry saw aluminum, the new universal metal, in clay. Every clay bed was a mine of it. At first aluminum was worth a hundred dollars a pound. It is so cheap now that scientists regard it as the metal of the future.

The paper-making industry utilizes more different kinds of waste than any other, and yet produces an amount of waste that is still the subject of much chemical study. The great bulk of the paper that is used in printing is made from wood-pulp or cellulose. The great American newspapers consume hundreds of acres of forest every day. Half the weight of the wood is wasted in the manufacture of the paper. No satisfactory method of avoiding this waste has been discovered as yet, although it is being sought diligently and certainly will be found some day.

Recently a process for the recovery of cellulose from



Discharging coke from a Semet-Solvay by-product oven into railway cars

hundred times sweeter than cane sugar, is now derived from coal tar. It is asserted that the discovery of this new artificial sweetening material has added as much to this country's resources as if a new sugar-producing State, like Louisiana, had been annexed.

The chemist also has discovered in petroleum refuse a host of medicines for the treatment of the most diverse diseases—fever, insomnia, pain—all are allayed by coal-tar derivatives. Invaluable antiseptics, like carbolic acid,



Courtesy System
Empty tin cans are collected in New York by street cleaning contractors

asparagus waste from canning factories was discovered. This waste represents 30 per cent. of the whole asparagus stalk. In addition to being useful for papermaking, this cellulose may be made into bandages, blasting material and fine tissues.

The residue of cornstalks has become a great factor in the manufacture of the better classes of paper. The food substances first extracted from the stalks are of much value also. More than a hundred million acres are planted with corn in the United States every year. The use of rice straw in papermaking is old in the Orient, but comparatively new in America. Cotton hull fiber—the lint which remains adhering to the hulls after the fiber has been removed in the gins—is also coming into use as papermaking material. Mixed with cornstalks, broom corn or rice straw it adds softness to the paper.

The ever-growing need for new fibrous materials from which paper may be manufactured cheaply, in order to diminish the increasing waste of the forests, has caused the whole earth to be ransacked. Various kinds of grasses, the products of both the temperate and tropical zones, are being experimented with. Bagasse—the waste material from the crushing of sugar cane—is looked upon hopefully. Bamboo, which grows with extraordinary rapidity, is also regarded as another excellent possibility.

Cotton-seed used to be cast into streams or be heaped up into great piles and left to rot, despite the State laws against such disposal of this troublesome by-product. The status of cotton-seed has changed mightily in the last fifty years. In 1865 the question was how to get rid of it. Ten years later it was found that it was a good fertilizer. In 1885 the discovery was made that it was a good food for cattle. It was not until the early 90's that its real usefulness and value as a by-product was realized. A very good substitute for olive oil is now made from this once-condemned seed; also a substitute for lard. Cotton-seed oil is an important ingredient of many highly nutritious prepared foods, of oleomargarine, of a cathedral burning oil, of a tempering oil, of a heavy machine oil, and a substitute for more expensive fats in soap-making. After the oil has been pressed out the seed is better for fertilizing and as a cattle food than it was before. Even the fiber of the seed, which has to be removed before the oil is expressed, is used in the making of mattresses, felt hats and pillows.

The world uses so much oil for food and other purposes that the globe is being searched continually for oil-bearing seeds and nuts of all kinds. Many that formerly were considered valueless are now being utilized successfully. The nuts of the cocoanut palm have been one of the great standbys in this respect. Oil and many valuable by-products that are exported largely are derived from this source. Cocoanut oil, in its original state, is a white, butter-like solid having a greater specific gravity than most vegetable fats. It is a highly complicated compo-

sition, and its ultimate industrial possibilities still remain undeveloped. The principal uses, thus far, for cocoanut oil, are in the manufacture of candles, artificial butter, and a soap that can be used with sea water. From the residue of the manufacture of this oil a valuable food for livestock, called "poonac," is obtained. The desiccated meat of the cocoanut is used in the making of confectionery. From coir, the fiber of the husk, is made a great variety of articles—rope, matting, mops, etc.

The amount of wealth that is now obtained from agricultural by-products is amazing. Corn, which is one of our great crops, is so abundant that all of it cannot be fed to livestock or distilled into whiskey. Practically all the starch used in this country and exported is made from corn. The refuse from starch manufacturing is converted into various saleable forms, among them a syrup for table use; also an oil that is a fine machine lubricant, or an excellent dressing for wool. The cake left after the oil is pressed out is a staple cattle food, and is largely exported. Corn is also the chief source of the sugar called glucose—boiling corn starch with acids yields sugar.

The uses of cornstalks are many. The pith of the cornstalk is one of the greatest known absorbents of water. Vast quantities of it are used in the lining of warships. If the armor is pierced, the pith lining swells at once, closes the opening made and stops the intruding water. The farmer of a generation ago used to burn his cornstalks, or stack them up and let them rot. Nowadays, those that he cannot dispose of in other ways are ground for fodder for cattle, or packed away in silos for the same purpose. Little is wasted.

Eminent chemists assert that some day they will be able to make wood an important source of human food. When this is so, it will lift sawdust to a higher plane of utility. At present its principal uses are for fuel (when briquetted), for stuffing dolls, and for making furniture. To form it for the last-named use the sawdust is mixed with glue-water and soluble glass, or blood and potassium bichromate. Then it is placed in molds and subjected to great pressure. When polished, this *bois durci*, as the French call it, has a beauty of appearance not found even in rosewood or mahogany.

The utilization of slaughterhouse by-products has been carried to the vanishing point. The beef and pork and mutton that reach the butcher shop represent only a little more than half the whole animal. The packing-house makes a large share of its profits from the by-products. There are so many of these that it would be wearisome to list them all. From the gray brain-matter of calves comes a medicinal product for the treatment of many nervous and mental disorders. From the glands and membranes, pepsin, thymus, pancreatin and other aids to digestion are extracted. Teeth are used for studs and buttons. The carcass of a single beef enters into several hundred

The cans are shoveled into hoppers and then melted to recover the tin and solder

Courtesy System



different articles, from food for the human body to food for the soil.

Another comparatively new and extensive use for sawdust is the manufacture of wood alcohol, acetic acid, wood naphtha, oxalic acid and tar. Artificial silk is being made from wood also. A pine tree, turned into viscose and spun into silk, is transformed from lumber worth ten dollars to a fabric that will measure up more than five thousand dollars in value. The process, however, is so long and expensive that the net profits are not so large as they would appear. But it indicates interesting possibilities.

In the early days of the oil industry a vast amount of the crude petroleum was wasted in the process of refining. To-day practically nothing is lost. Crude petroleum is a mixture of an indefinite number of compounds of hydrogen and carbon, varying in character from the lightest of naphthas at the top to the heavy residuum at the bottom. The process of refining is known as fractional distillation, which depends on the fact that each of the constituents has a different boiling point, or point at which it passes from a liquid to a gaseous state, as water does when it becomes steam. To-day the proportional constituents of crude oil are as follows: kerosene, 50 per cent.; residuals, 19 per cent.; gasoline, 16 per cent.; lubricating oils, 15 per cent.

The gasoline and residuals used to be thrown away. In 1875 there was a small demand for gasoline by gas companies. They used it to enrich their product, and paid about a cent and a half a gallon for it. Then came the automobile age which created a market for this once despised product. It now sells for from twenty to twenty-five cents a gallon, according to the locality. More than fifty million gallons of gasoline were used for fuel last year for engines of all sorts.

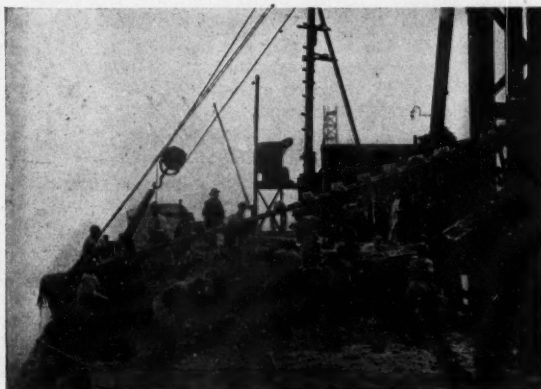
From the 19 per cent. of residuals of petroleum a host of things are manufactured. Many of them—drugs, medicines, perfumes, colors, etc.—are first cousins or brothers of the coal tar products. The vaseline derivatives are obtained by filtering the residuum through boneblack. The first result is a brownish yellow substance which is not affected by acids, is almost free from odor, and is semi-solid at ordinary temperatures. When the values of all the products of the refuse from refining are added together the total is almost as great as all the rest put together.

Science, the inquisitor, has pried into even the slag from blast furnaces. This forbidding material is most commonly used in cement and concrete; it is also spun into a kind of wool, which is used as a packing or insulator for steam-pipes. The slag from one process of steelmaking is rich in phosphoric acid, and is an important factor in the making of fertilizers.

It may be said that industry is founded on processes of combustion. The marketable substance of smoke is soot. Many fortunes have been made out of the collection of soot. The smoke of natural gas is chemically pure carbon.

Garbage is delivered by belt conveyors to a company which utilize its by-products

Courtesy System



Courtesy System

Chutes deposit the garbage into "digesters"; this process yields fertilizers and grease for making soap

From it carbon black, the universal coloring agent of printer's ink is obtained. It is a long journey from the gas well to the printing press, however. Last year about 12,000,000 pounds of this soot were shipped from the gas belts of Pennsylvania, Ohio and West Virginia. Before the process of obtaining the soot from natural gas was discovered, carbon black sold for from five to seven dollars a pound. It is now less than ten cents a pound. The lowering in the price of soot has been one of the factors that have helped to make possible the cheap books, newspapers and magazines of the present day.

Chemists recently announced the discovery of a use for maple sugar "sand," a waste product in the production of maple syrup, and hitherto thrown away as valueless. This "sand" contains about 50 per cent. malic acid, which in some ways is superior to tartaric acid for use in foodstuffs. Therefore from this waste material a new and superior kind of baking powder has been evolved.

There is waste and salvage at every step. The scales of fish are transformed into imitation pearls. Gelatin, glue and a substitute for isinglass are made from useless fish and fish offal. Broken pottery and white or colored glass are utilized for making mosaic pavements. The wool is extracted from generation after generation of garments, and is used over and over again until it is worn practically into thin air. These are mere random instances of the cycle of nature and industry that is touched by the magic wand of science.

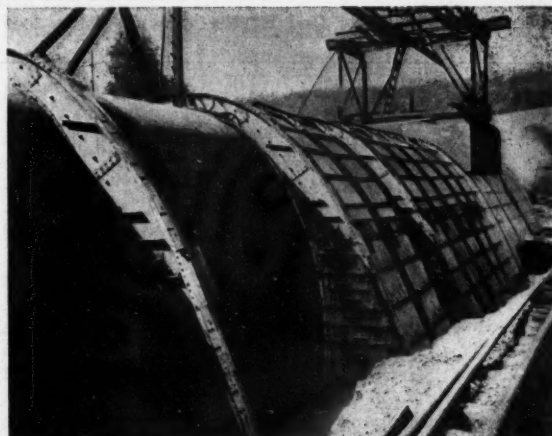
There are millions in old iron and millions more in rags, waste paper and discarded rubber. The scrap iron business is a huge one. The railroads have to dispose of tens of millions of dollars worth of scrap each year. More than six thousand locomotives annually find their way to the junk pile. The biggest scrap heap in the world was accumulated at Jersey City, N. J., a few years ago. It was the refuse machinery that was picked up from along the Panama Canal—thousands of tons of iron and steel and brass, abandoned by the French company, and rescued from the jungle by the junkmen. It made a mountain of metal. By now it is on its next cycle of usefulness.

The business in rags, paper stock, rubber and kindred castoffs is nearly as great as it is in old metals. There are twenty-five different gradings or classifications of cotton rags alone. Woolen rags have more than seventy classes. A large share of this woolen waste goes to the carpet mills.

There has been such a tremendous increase in the demand for rubber of late years that its price has soared, carrying with it all sorts of rubber scrap. New York City receives about \$75,000 worth of rubber scrap every week; so does Chicago, and other large cities in proportion. The United States takes half the world's production of rubber, and every carload of old rubber boots and shoes helps to supply the demand for automobile tires, insulators, and other things.



Typical side-hill section of cut-and-cover aqueduct, showing progress of construction



Cut-and-cover section showing interior and exterior forms and concrete covering

BRINGING MOUNTAIN WATER TO NEW YORK

(Continued from page 71)

was noted for the perfect control of the boilers and compressors and the daily charts showed only a very small variation in either the steam or air pressure.

Some very large Venturi meters, which are the largest water meters ever built, are located in the aqueduct. One of these is situated just below the Ashokan Reservoir, and there are two more, one on either side of the Kensico Reservoir. Each of these meters is 410 feet long and is constructed of reinforced concrete, except the throat casting and the piezometer ring, which are of cast bronze. In addition to these large meters, five gauging chambers have been built in various parts of the aqueduct where the flow of water can be measured by current meters. Special machines are being devised for supporting and moving the current meters when a measurement is being made.

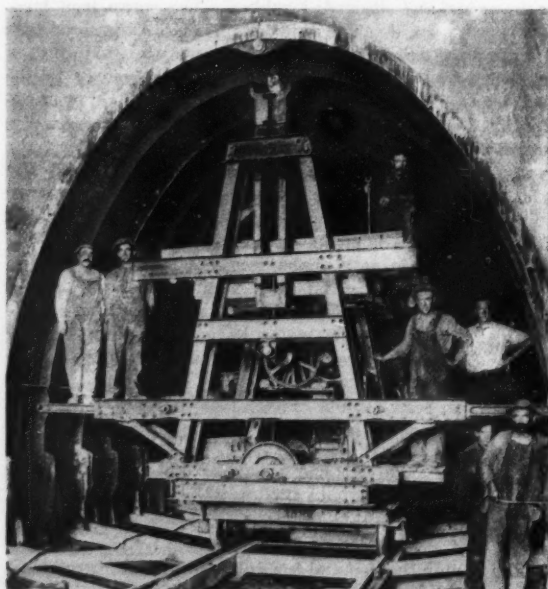
At the beginning of the year the aqueduct was finished down to Hillview Reservoir, with the exception of a few hundred feet that have been left uncompleted for special reasons, and the work on the city distributing tunnel was advanced to such a point that taking the system from the Ashokan Reservoir to the Silver Lake Reservoir on Staten Island—the terminal point—about 92.8 per cent. of the entire construction work had been completed. This is the

status of the work after seven years of hard labor. The maximum number of men directly engaged in the construction at any one time exceeded 17,000, and if those indirectly employed are considered this figure is swelled to 25,000. The preliminary work was very great, aside from the actual construction of the aqueduct. It was necessary to remove seven villages, together with 32 cemeteries. Eleven miles of railroad had to be relocated, and 40 miles of highways were built to replace 64 that will be eventually submerged.

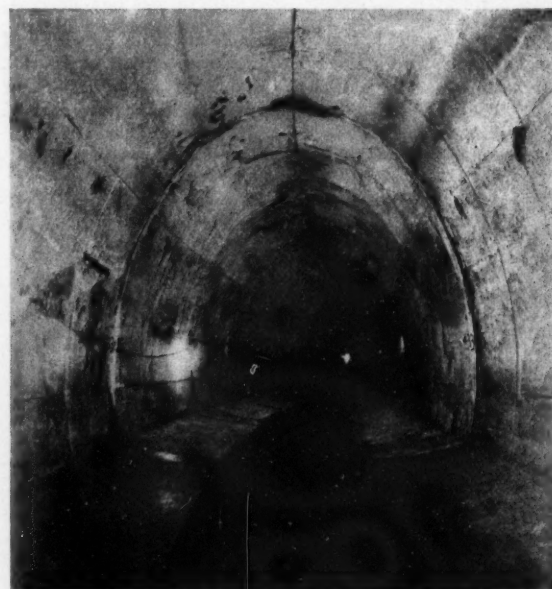
There are few engineering works to which the Catskill Aqueduct may be compared. It is considered to be fully as great a feat as the Panama Canal which is soon to be opened. A similar but smaller aqueduct constructed by the Romans in A. D. 50 to drain Lake Fucinus is one of the few comparable to that beneath New York City. Here 32 shafts varying in depth from 65 to 425 feet, according to some authorities, were sunk, but it took 30,000 men 11 years to bore this tunnel which was but three miles in length.

At the present time New York City consumes in the neighborhood of 500,000,000 gallons of water daily. Assuming that the population, exclusive of business people who live elsewhere and transient visitors, is over 5,000,000, the allowance of fresh water per day for each inhabitant is a trifle less than 100 gallons.

Electric car used to move the collapsible steel forms used in the aqueduct



View of interior of finished aqueduct, showing general size and shape of tunnel

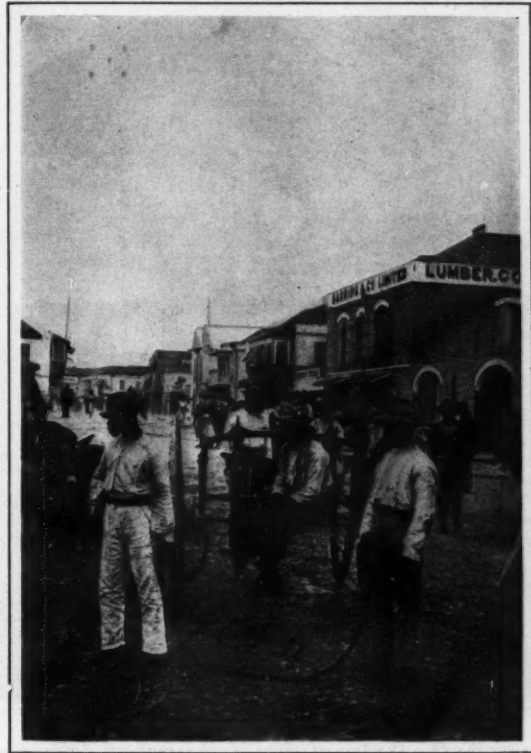


Picturesque Views Around the World



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A picturesque bit of old Holland—Scene on the Numansdorf Dyke



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The "Spider" with which stevedores handle sugar barrels at Bridgetown, Barbados



Copyright by Underwood & Underwood

Nightingale Mine at Blue Hill, in the richest gold field in California



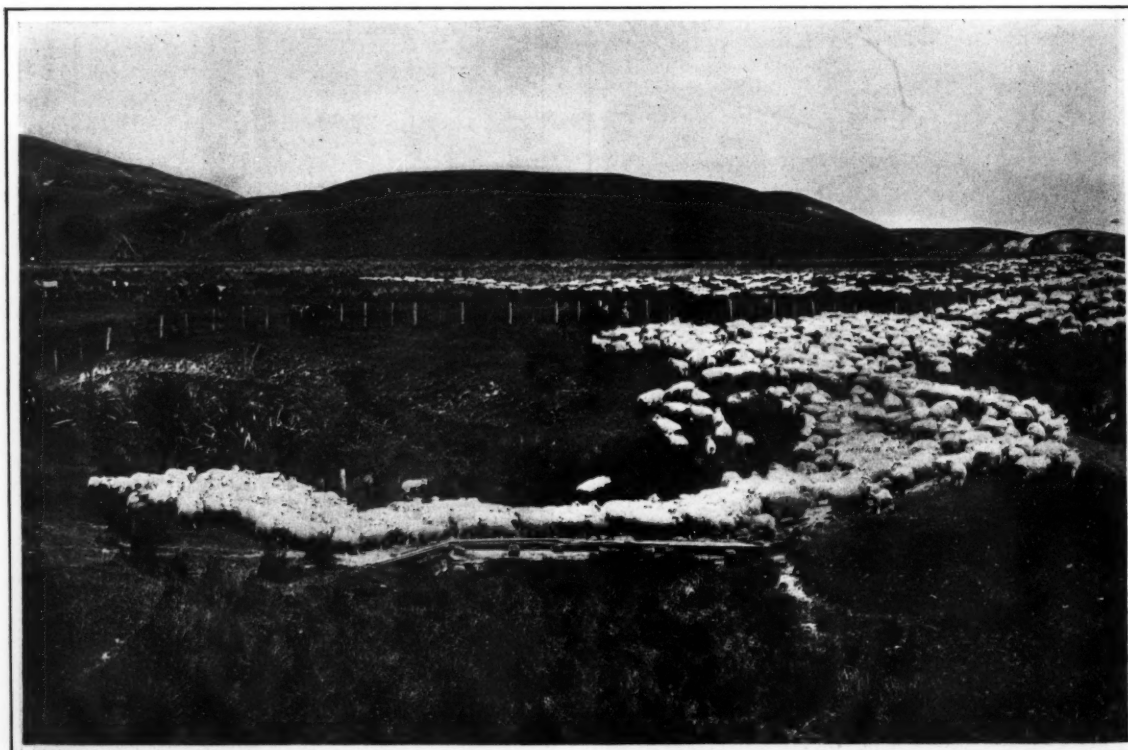
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A fleet of North Sea fishing boats alongside the pier at Helder, Holland

THE RICH GRAZING LANDS OF NEW ZEALAND

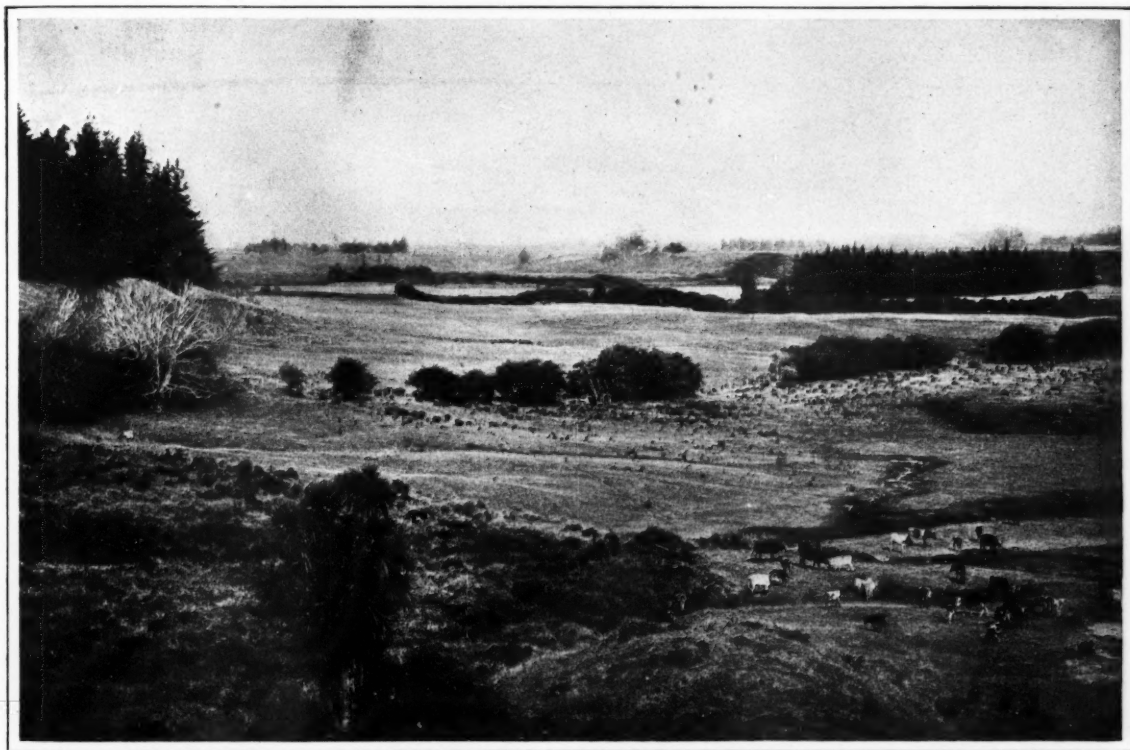


Taranaki, the center of one of the richest dairy districts in New Zealand, showing a typical herd of New Zealand cattle—Mt. Egmont in the distance



Mustering sheep at Wairarapa, New Zealand. This colony is fast becoming one of the leading sources of the world's wool and mutton supply

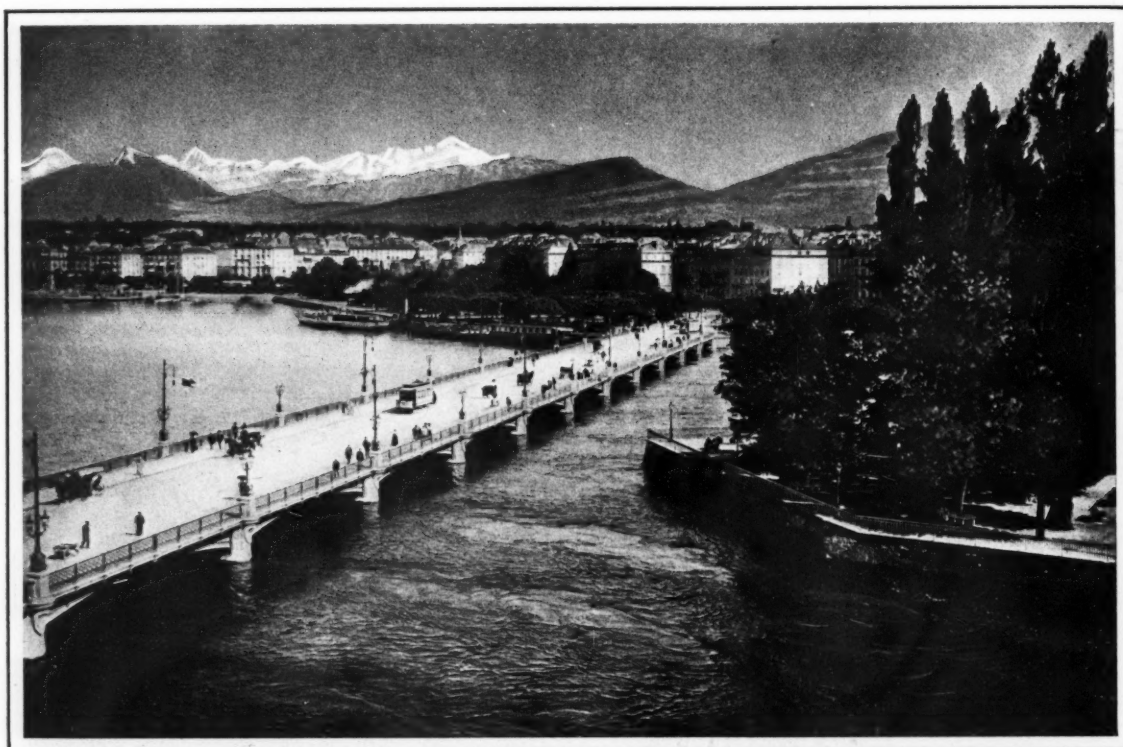
THE RICH GRAZING LANDS OF NEW ZEALAND



Cattle in the Waikato district of New Zealand, where the grazing lands are said to be among the finest in the world—The colony ships much of its beef to Great Britain



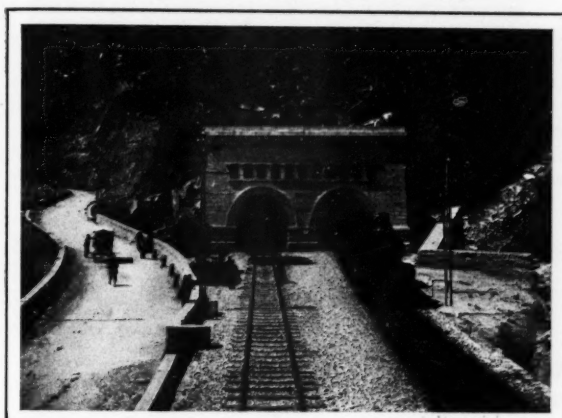
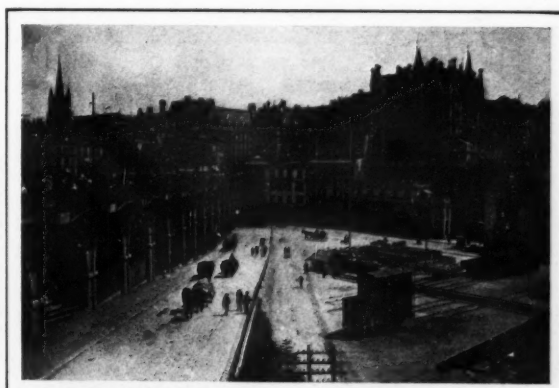
Fat lambs at Tamahere, New Zealand. The Panama Canal may bring increased quantities of Australian and New Zealand beef, mutton and wool to the United States



PICTURESQUE SWITZERLAND

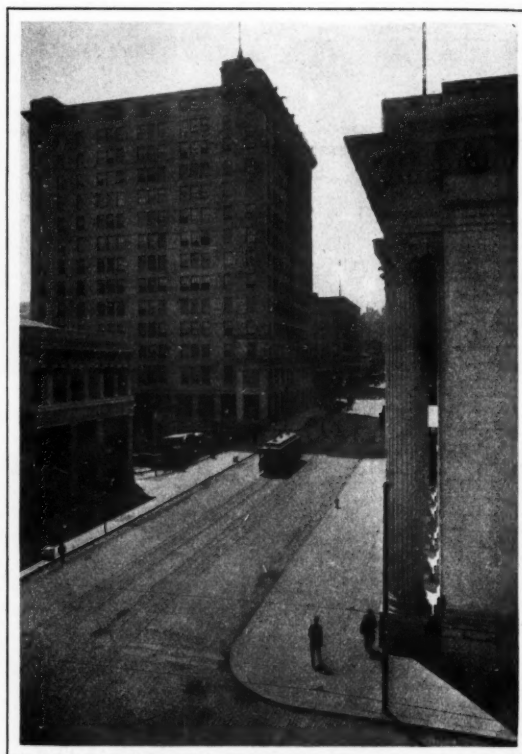
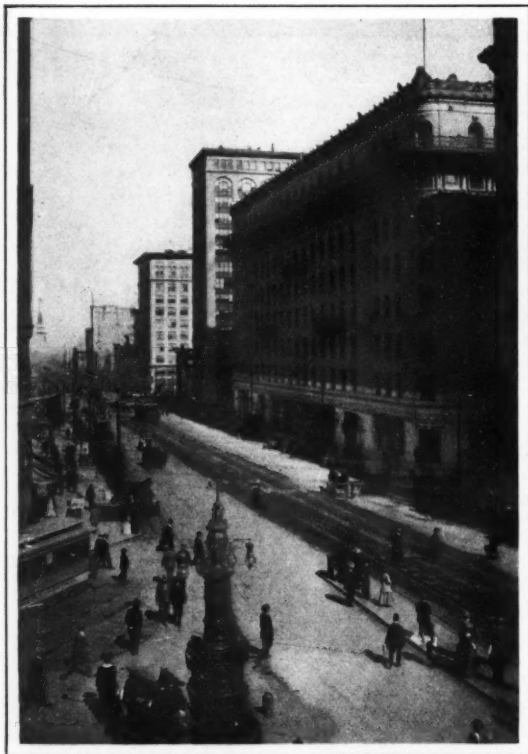
In the summer months the number of tourists who turn toward the mountains of Switzerland is increasing steadily every year. The upper illustration at the top of this page shows a portion of the beautiful city of Geneva, with Mt. Blanc towering in the distance, while the lower illustration shows the city of Lucerne lying in the shadow of Mt. Pilatus. In addition to its wonderful mountain and lake scenery the Swiss Republic





contains many interesting old towns and cities, with handsome well-kept streets in the newer portions and many quaint medieval structures in the older parts. The small illustration at the left, at the top of this page, shows the market place at Basel, while that at the right shows the Grand Pont at Lausanne. Below these at the left is a view of the entrance to the Simplon tunnel at Iselle and, at the right, of the Bahnhofstrasse at Zurich. The view at the foot of the page shows the Grossmunster at Zurich.

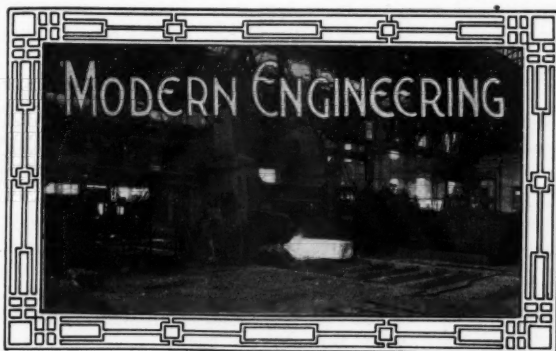




SAN FRANCISCO, THE EXPOSITION CITY OF 1915

In a few more months the interest of the commercial world will be once more directed toward San Francisco, which is to be the host of the nations at the greatest international exposition held since that at St. Louis in 1904. The rapidity with which the Californian city rose from the ruins of the great earthquake is still remembered and the accompanying illustrations show the solid and substantial character of the new buildings since erected. The view at the left, at the top of this page, shows Market Street, near Kearny Street, while the one at the right shows the corner of California and Sansome Streets. The lower illustration shows another view of California Street taken in the heart of the financial district.

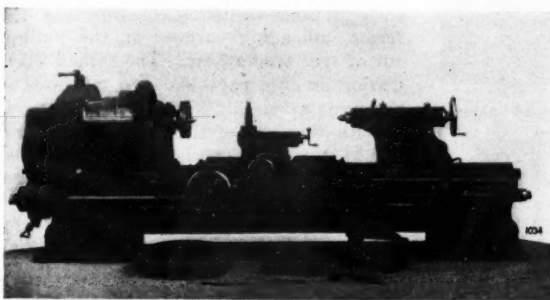




AN IMPROVED ENGINE LATHE

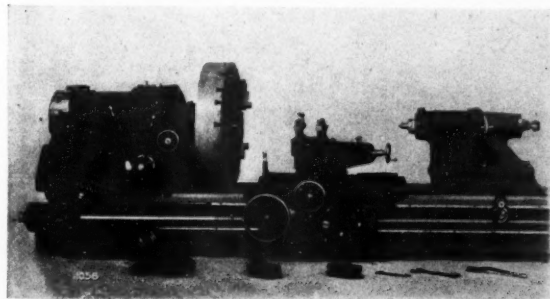
By Means of a "Selective Head," Embodying the Gear Type of Transmission, any Spindle Speed can be Instantly Selected

An engine lathe which has recently been placed on the market by a leading manufacturer is claimed to embody a number of improvements that enable it to render much more efficient service than the ordinary machine of this description. By means of a gear arrangement in the head it is possible to select at once any speed desired, and



A 30-inch, 3-step cone head engine lathe showing recent improvements in headstock housing

as there is only a single speed driving pulley running at a high belt velocity, the delivery of ample power to the cutting tool under any conditions is assured. This feature of instantaneous speed selection enables a great saving of



A 48-inch selective head triple gear engine lathe designed for the heaviest work up to 48 inches diameter

time to be effected when running on different classes of work and is also a notable advantage when the diameter of the metal in the lathe is subject to sharp variations, as it saves wear on the tools and bearings and renders possible the production of extremely well-finished work.

There are twelve speed changes in the head of this lathe, six of which are obtained in the gear box. The entire

speed-changing mechanism, except the back gears of the headstock proper, is contained in the gear box, which is an independent unit, tongued and bolted to the back of the headstock. It can be removed at any time without affecting the other working parts. It is oiltight and dustproof and the gears always run partly submerged in grease. The six speeds obtained by the gear box are controlled by two conveniently situated levers, and a plate on the front of the headstock gives a complete list of all speeds and shows the proper position for producing them. Quick change gears, for feeds and threads, made of drop-forged steel, are located beneath the headstock and firmly supported in the walls of the bed. All changes of feed or thread can be easily and readily made while the lathe is in operation. Other equipment consisting of multiple stops for length and cross feeds, connected compound and plain rests, pan pump and tubing and a four-way tool block, which are valuable appliances when repetition turning is being done, can be furnished when desired.

Illustration No. 1 is a 30-inch 3-step cone head engine lathe and gives a very clear idea of the appearance of these lathes. It shows the improvement in the way of raising the headstock housing to the center line of the spindle so as to tie the front and back spindle bearings firmly together, the heavy carriage and wide bridge, the massive tailstock, etc. The second engraving shows a 48-inch selective head, triple-gear engine lathe, designed for the heaviest kind of work in diameters up to 88 inches. Owners of shops in which these lathes have been installed speak highly of the quick and easy manner in which they can be handled, due to the improvements mentioned above.

A PORTABLE ELECTRIC VACUUM CLEANER

THE immense popularity of vacuum cleaners has led to the production of many different types of these useful machines. One of the most novel of these has just been placed on the market and seems likely to supply a range of demands for which the larger and heavier machines were hardly suited to meet.

The new device consists of a brush and vacuum cleaner combined, together with a small dust receptacle, and is sufficiently light in weight to be readily handled by one person. It is operated by a small electric motor and has no cumbersome hose, only a flexible cord for connection to any electric circuit. It is made for either direct or alternating current, and for any voltage.

This type of vacuum cleaner has already been widely adopted for use by porters in hotels, barber shops and parlor cars, for dusting the clothing of patrons. It has also been found to be very useful for cleaning upholstery in railway cars, automobiles, hotels, etc. Another type of this portable cleaner is designed for currying live stock, and it is said to be not only very effective for this purpose, but much more sanitary than the ordinary type of currying comb.

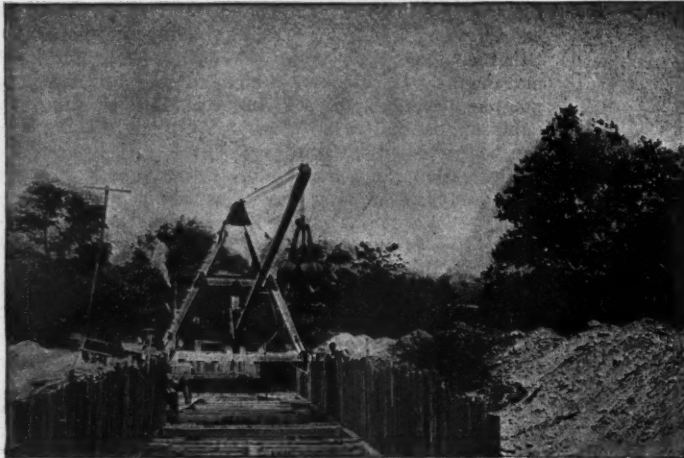


The "Dumore" portable electric vacuum cleaner

THE INCREASING USE OF SKID EXCAVATORS

Some of the Advantages of these Labor-Saving Machines for Digging Work of all Kinds

ALTHOUGH skid excavators have always been extensively used by firms or contractors having a large amount of excavating work to be done, such as digging of ditches or irrigation canals, or rehandling of coal, ore, sand, etc., their simplicity, efficient service and easy operation



A skid excavator with bull wheel swing is adapted to work under unusual conditions—here it is digging a sewer

have given these machines a greatly increased popularity within recent years. One advantage possessed by this type of excavator is that, being placed on large skids, the weight of the machinery is distributed over an extensive base, which eliminates the danger of its sinking into the ground or being tilted when subjected to the strain incident to the digging. Another distinctive feature is that, unlike steam shovels and other machinery of this class, the skid excavator backs away from the excavation, which ensures a solid foundation for the machinery, and when water is encountered enables it to keep at work without the necessity of pumping. The machine can also be moved sideways, whenever desired during the course of the work, which is especially valuable when banks cave in and it becomes necessary to handle material that otherwise would be out of the reach of the boom.

The construction of the machine is very simple, an "A" frame at the end of a platform supporting the boom from the end of which the bucket is suspended, and the boom being attached to the platform at a point just behind this "A" frame. The swing of the boom and the hoisting, opening and closing of the bucket in the smaller machines are controlled by the engineer, which renders the cost of operation very low and constitutes another important factor in favor of the skid excavator.

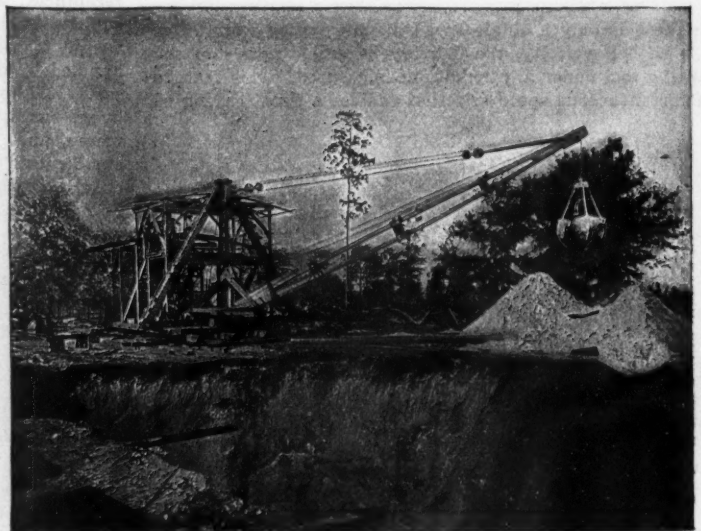
Excavators of this type are made in three general styles to meet various digging conditions. For ordinary work, in places where great speed is desired, what is known as the stationary topping lift is employed. This means that the radius is fixed and the boom or jib cannot be raised or lowered. With this type of lift, the excavated material is usually placed on one side of the work only, and outfits of this kind are very often employed for digging drainage canals through marshy or swampy ground, as the excavation

does not have to be kept dry. The "Topping Lift", as it is called, is of wire rope and in the stationary types is fitted to the boom's outer end-pin and to the peak of the "A" frame by a shackle carrying a sheave.

The return of the bucket to its position is automatic, because in swinging from the center to whichever side the load is to be dumped the boom end travels slightly upward, so that when the bucket is emptied its own weight causes it to return to its original position.

A second style has the lower part of the frame constructed to receive a turn-table or "Bull Wheel," as it is called, which forms a pivot upon which the boom swings. The upper illustration on this page shows a small skid excavator with Bull Wheel swing and stationary topping lift, straddling a sewer and digging between cross braces. This style of excavator is very well adapted for working under very unusual conditions. In the third style, the Bull Wheel is also employed, but the topping lift is so adjusted that the boom can be raised or lowered, which is an advantage if the machine is intended for use in places where the material excavated is to be placed at a considerable height above the ground, or where the bucket is to be detached and the machine used as a regular derrick for such purposes as lifting concrete tubs and forms, unloading cargoes or the pulling out of tree stumps, etc. The second illustration on this page shows a machine of this type at work.

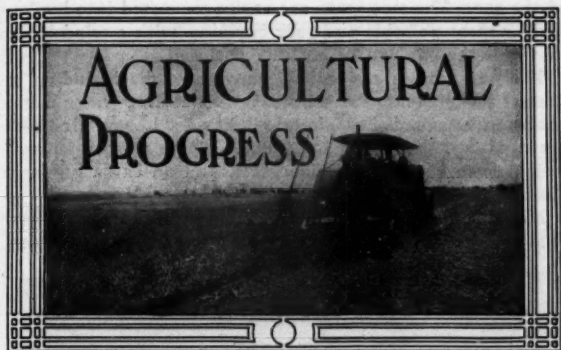
With the first of these machines, from two to three trips can be made per minute, with the second, one to two trips per minute, and with the third about one trip per minute. Each of the three types will dig to any depth desired, this being limited only by the length of the rope, and all can be operated by either steam, electric hoists or gasoline engines. Various styles of buckets are supplied with these excavators, the kind being governed by the work for which they are to be used, while if desired, what is called a drag scraper can be ob-



A skid excavator of one cubic yard capacity, equipped with bull wheel swing and variable topping lift to raise or lower boom

tained that will dig at any angle any kind of material, from light loam to "rotten rock."

The machine is moved as the work progresses, by placing extra skids at the rear of the platform, to which one end of a rope is attached by means of a bridle. The other end of this rope is passed through a block fastened to a tree or other object and then connected with the winch.



POWER PUMPS—ANCIENT AND MODERN

Efficient Pumping Machinery is now Recognized as Essential to the Farmer's Success Throughout the World

WHILE the pump is one of the very oldest mechanical devices invented by mankind, it is a somewhat remarkable fact that for thousands of years very little progress was made toward perfecting this important farm auxiliary. In many parts of Asia and Africa the tourist can still see types of pumping apparatus at work that were designed long before the Christian era. While some of these contrivances are very interesting as survivals of primitive methods, the best of them—as measured by modern standards—show a very low degree of efficiency, and



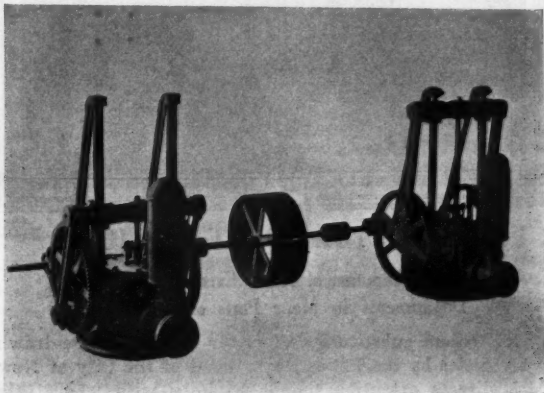
Pumping outfit operated by oxen, still in use in the mountains of Syria

the fact that they have continued to be used for so many centuries with little or no improvement can only be explained by the cheapness of labor in those localities and the comparatively modest requirements as to volume of water supply they were called upon to deliver.

During the middle ages the windmill as a pumping device attained a very wide popularity, particularly in the low countries of Northern Europe, where many of them have survived even to the present day owing to the fact that—when once erected—they cost very little for maintenance and repairs. It was not, however, until the Nineteenth Century that mechanical pumps were designed and perfected that combined high efficiency with low cost of upkeep. To-day the picturesque windmills of Holland and Belgium and even the mule or oxen-driven sweeps of the Orient are rapidly disappearing and being replaced by modern pumping machinery.

One of the most efficient types of modern pumping apparatus is the power pump working head shown in the second illustration herewith. In this device the pump is driven by two pinions placed on the same shaft, which in turn drives two gear wheels that convey the power to the piston. This arrangement gives great strength with a minimum weight of material, and also avoids torsional

strain. Pumps of this kind are made in a variety of sizes; and another style, embodying the same mechanical principles, differs from the one shown in the illustration only in the fact that the working head is set in a horizontal position instead of vertical.



F. E. Myers & Bro.

Two Bulldozer working heads connected in tandem for pumping water from wells

These pumps can raise water over 15 to 20 feet perpendicularly and can draw it horizontally any reasonable distance—some pumps in use being located 500 feet from the water supply. These pumps are made in various sizes; with capacities ranging from 350 to 7,200 gallons per hour.

SPADING HARROWS FOR DRY FARMING

A TYPE of harrow that has proved particularly well adapted for use in dry farming regions, where a dust mulch is desired in order to preserve the small amount of moisture that is normally available, is the spading harrow shown in the accompanying illustration. In this implement, which can be drawn by either two or three horses, the harrow blades are so attached that they spade up the earth more deeply and pulverize it more finely than can be done by ordinary disc or tooth harrows.

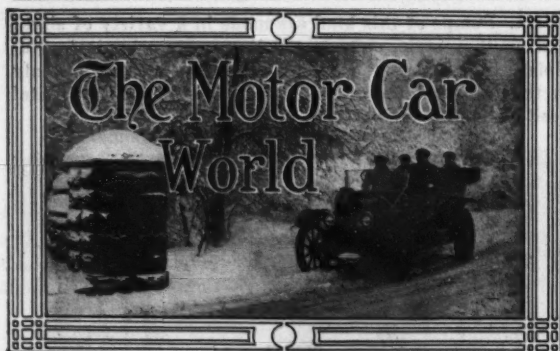
The action of the spades forms cup-like cavities below the surface of the soil and these receive and hold the water from rains and dashing showers and thus conserve the



Ward Plow Company.

A Morgan spading harrow making a dust mulch to preserve moisture

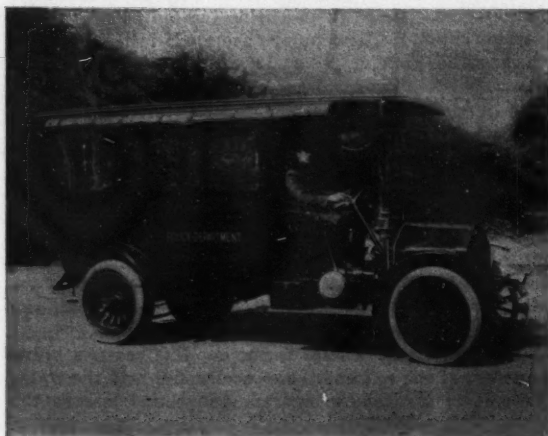
moisture for the benefit of growing crops, whereas a plow would cut furrows that would cause the water to run off or collect in small pools on the surface where it would evaporate immediately in the sunshine after the shower was over. This feature makes the spading harrow particularly useful in orchards, as it prevents the rainfall from running off or evaporating and preserves it where every particle can be reached by the network of roots below the surface of the soil.



AUTOS FOR POLICE SERVICE

Rapid Adoption of Motor Cars by the Police Departments in Many Parts of the World

THE recent substitution of motor cars for horse-drawn vehicles by the Police Department of the City of New York directs attention to the rapidity with which this branch of public service is being motorized, not only in the leading cities of the United States, but throughout the world. The advantages of motor cars for police patrol wagons are too numerous to be recounted in detail. One of the most important is the speed with which a platoon



Willys-Overland Co.

One of an extensive fleet of motor cars recently purchased by the Police Department of New York

of policemen can be hurried to a danger point in the event of a riot, conflagration or some similar emergency in which rapidity of action is of vital importance. Another manifest advantage is the fact that the cars can be kept in readiness for instant service at all hours and the garage located close to each police station—which would seldom be possible in the case of a stable for horse-drawn vehicles. Added to these factors is the equally important consideration that in cost of upkeep motor vehicles have been demonstrated to be far cheaper in the end.

A MOTOR CAR CAMPING OUTFIT

AN exhibit that attracted great attention at one of the many shows held this year at New York City, was an automobile specially designed and fitted up for the use of sportsmen who wish to be independent of civilization while on a hunting trip. The body of this car was of the modified prairie schooner type constructed so as to be capable of withstanding rough usage, and provided with facilities for carrying sufficient food supplies to last for several weeks. There are accommodations for two persons in the front compartment, where there are two touring seats, while an ingenious arrangement of the cushions forms a second seat for two more passengers in the center

of the car. The side seats are easily converted into bunks, and by means of side and rear curtains, with a windshield in front, the car can be entirely enclosed.

The car carries an entire camping outfit, including a fireless cooker, tent, water buckets, self-cooling water bags, cooking utensils, dishes, electric lights, food bags, air-tight tin cans, lanterns, axes and guns. There is storage and locker room beneath the side seats, and an extra luggage box is suspended from the floor.

Mounted on a 48-horsepower chassis, this camp car has probably traveled into more remote places than any other



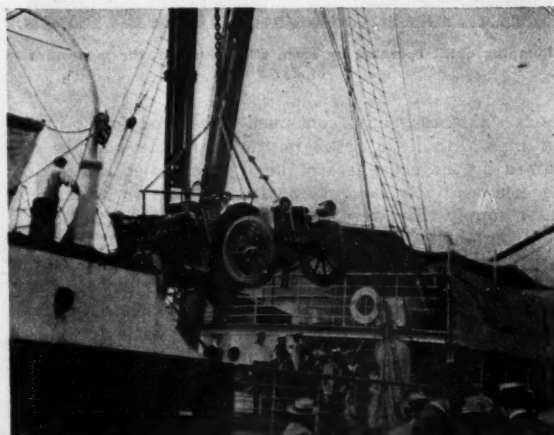
Packard Motor Car Co.

A large touring car especially fitted out with a complete camping outfit for outdoor life

vehicle in America. Early in 1912 it fought its way from Denver to the Grand Cañon in the face of terrific winter conditions on the Santa Fe trail. In 1913 it traveled 5,000 miles on surveys for the Lincoln National Highway.

MOTOR CARS ON FOREIGN TOURS

THIS is the season of the year in which a steadily increasing number of motor cars are being carried by their owners into every part of the world for pleasure touring. For the manufacturers these cars make excellent missionaries or pioneers, as they often penetrate into regions in which the motor car was previously unknown or a very great rarity, and thus familiarize the people with their appearance, sturdiness, comfort and general desirability. It is said that not a few of the far eastern potentates who are now among the best customers of motor



Placing an American touring car on board a steamer ready to start touring immediately on landing

car manufacturers placed their original orders with the makers of the first cars they had actually seen. Dealers also find that the cars from overseas that are touring in their vicinity greatly stimulate the number of inquiries they receive and are an important factor in determining the make of car their customers prefer.

Information For Buyers

As it is frequently impossible for advertisers to explain clearly the purpose or peculiar merits of their products in the advertising columns, space in this section is placed at their disposal to enable them to do so. It is proper to add that they, and not the publishers, are authority for the statements made.



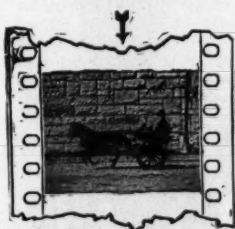
A New Multi-Exposure Camera

A DAYLIGHT loading camera, with which 800 pictures can be taken is a recent photographic production that is receiving considerable attention from sportsmen, tourists, travelers, explorers, amateurs and others interested in articles of this nature. The new camera, which is known as the Simplex Multi-Exposure camera, is manufactured by the Multi-Speed Shutter Co., with offices at 114-116 East 28th Street, New York City, U. S. A. The camera uses a 50-foot cartridge of East-

man Standard regarding this remarkably convenient little camera, should write the company for catalogues, and other literature, addressing them as above.

Excessive Perspiration and How to Correct It

EXCESSIVE perspiration is not a necessary evil. It is healthful to perspire, but not all perspiration is healthy. A goodly percentage of humanity is afflicted with an unnatural and unhealthy perspiration from



Actual size of small and large exposures



A daylight loading camera that takes 800 pictures of the small size shown herewith or 400 of the large size

man Standard certain small surfaces of the skin, like the armpits, feet, palms of hands, the upper lip or neck. This trouble is most general in the armpits and feet, where evaporation is hindered. It is frequently the cause of such troublesome complaints as eczema, due to the long, continued dampness. There are cases where the excessive perspiration of the armpits and feet exists to a degree that keeps

them always damp, even during winter weather, and this is often the cause of chills and continual colds.



A bottle of Odo-ro-no

This unnatural, profuse perspiration is called hyperidrosis. It is due to nervous overstimulation of the sweat glands and does not refer to the profuse perspiration which occurs over the entire body as the result of vigorous exercise, high temperature and other causes.

Unnaturally profuse perspiration is a local condition which cannot be successfully treated by internal medication. It is now recognized by medical authorities that relief must be sought in local treatment—a treatment which will correct the local irregularity without affecting the general condition of the body.

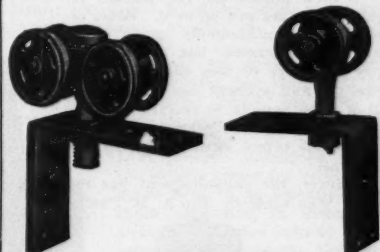
From the laboratory of a specialist comes a preparation to meet this need for local treatment. It is an unscented toilet water called Odo-ro-no. It is applied to the affected parts at night and is as harmless as bay rum or witch-hazel. One application leaves the parts daintily clean, odorless and naturally dry. It

relieves the unnaturally profuse perspiration where it is applied, but does not stop the perspiration which is necessary to health.

The preparation above referred to is manufactured by the Odo-ro-no Company of 651 Blair Avenue, Cincinnati, Ohio, U. S. A., who will be pleased to mail to any address catalogues and other particulars.

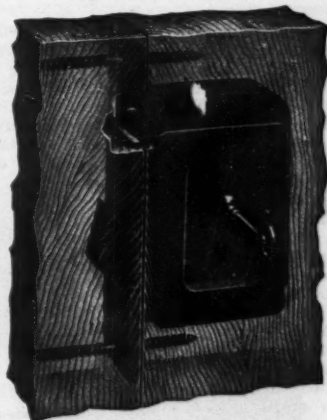
Locks and Trolley Hangers for Sliding Doors

TWO interesting building hardware specialties that have lately made their appearance on the market are an improved trolley hanger and an effective lock for sliding doors, both of which are manufactured by the Richards-Wilcox Manufacturing Company, 101-111 Third Street, Aurora, Ill., U. S. A. The trolley hangers are of very substantial construction and can be used on doors weigh-



Four wheel and two wheel ball-bearing trolley hangers for barn or stable doors, garages, etc.

ing up to 300 pounds. They slide on an enclosed track, which can be attached to either side or ceiling support. The hanger has both vertical and lateral adjustment, and the pendant bolt is attached to a clevis in such manner as to allow the door to swing out if desired. An outfit for a single door consists of two hangers, one center and two end brackets for side attachment, lag bolts for brackets and bolts for hangers. These hangers are built of the best quality material and are guaranteed by the makers to be practically unbreakable when subjected to ordinary wear. The lock, above mentioned, is of the mortise type and is intended for sliding doors of any size not less than 1½ inches thick. These locks fasten automatically, and the latch is released and the door opened by the same movement. They can be used on either single or double doors, and while presenting a very attractive appearance, are very strongly made. The makers state that they are moderate in price and are being used in steadily increasing quantities by owners of



Sliding door lock, mortise type, embodying lock, latch and flush door pull combined

buildings who are looking for a reliable article of this nature. Builders, hardware dealers, ironmongers and other merchants handling goods of this kind should write to manufacturers for catalogue and prices, which will be sent to any address upon request.

An Improved Kerosene Engine

THE great advantages of the internal combustion engine and its easy adaptation to many industrial purposes, especially when only a moderate amount of power is required, has resulted in a remarkable expansion in its use in almost every country in the world, but its almost universal employment and the advent of the automobile has so increased the consumption of gasoline (petrol), which has heretofore been the most popular kind of fuel, that the price of this substance has been advanced to a very high figure. The consequent enhancement in the cost of operating a gasoline engine has naturally been followed by efforts to find a cheaper fuel that would give equally satisfactory results, which, however, up to quite recently have not met with altogether unqualified success.

Kerosene as a substitute has attracted probably most attention and many engines have been placed on the market in which this fuel can be used. Some of them have undoubtedly given very satisfactory service, but, as a rule, they are more or less complicated to care for and operate, and practically all of them have to be started and run for a more or less protracted period on gasoline before switching on to the kerosene.

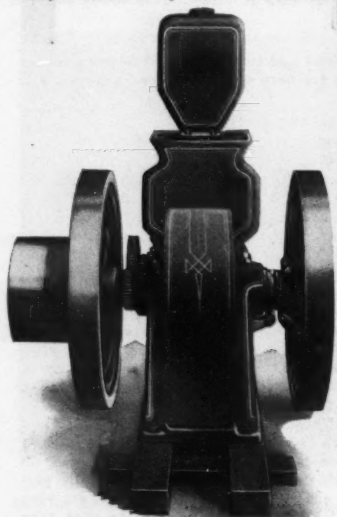
However, the announcement has recently been made by The A. M. Castle

the top of the engine, so that the fuel will flow by gravity to the primary cylinder and the engine will operate perfectly on any distillate of 32 gravity or above.

The ignition is controlled by the primary cylinder and is always adjusted for the special fuel that is to be used, and if there is much difference in its gravity or viscosity different primary cylinder cups will be necessary as the heavier oils require larger openings than the lighter ones. The difficulties met with in the proper vaporizing of the fuel,

25 revolutions per minute will pump 7,200 gallons of water to a height of 25 feet in one hour.

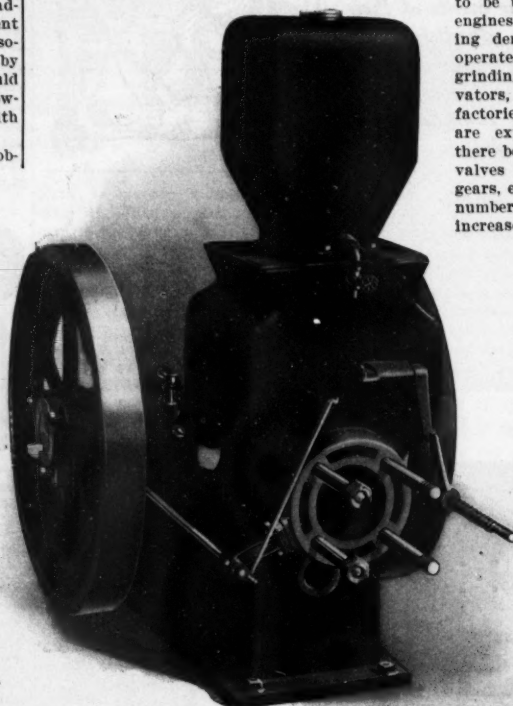
The manufacturers of the Castle engines call the attention of those who prefer to use gasoline for fuel to their mogul type semi-automatic gasoline motors, which they state will give excellent service in any place where power is needed. They are of the four-cycle type, and the 4 and 7 horsepower sizes can be equipped with pump jack attachments direct connected to the base, when they are to be used for pumping water. These engines are designed to supply the growing demand for easily understood and operated moderate-sized power plants for grinding feed, sawing wood, running elevators, small machinery in shops and factories, printing presses, etc. They are extremely simple in construction, there being no auxiliary ports or exhaust valves and no unnecessary cams, rods, gears, etc., which does away with a great number of wearing parts that tend to increase wear and lost motion as well as cause considerable waste of power. Fuel consumption has been reduced to a minimum, these engines being so designed that it is impossible to waste a charge, as an explosion is necessary to open the exhaust valve.



Front view of 4-horsepower type

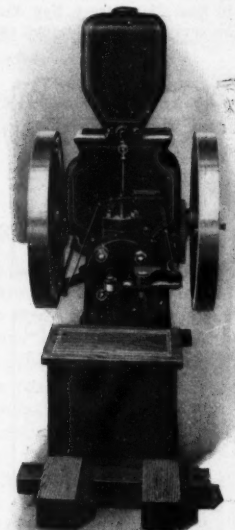
Engineering Company, of La Crosse, Wis., U. S. A., that they have succeeded in producing, after a long series of experiments, a new type of engine in which kerosene is used exclusively for fuel. These engines are built in five sizes, 4, 8, 12, 30 and 75 horsepower, and have the distinctive feature of starting directly on kerosene oil without the use of batteries, magnetos, wiring connections, carburetors or ignition apparatus of any kind. The accompanying illustrations give a number of different views of the 4-horsepower size, which has at once acquired great popularity for operating light machinery on the farm or in the shop and pumps for irrigation or furnishing a water supply.

The engines are of the 4-cycle high pressure type and are guaranteed to run equally well in either hot or cold weather. They are of the horizontal type of construction and hopper-cooled, and being entirely self-contained can be mounted on skids and readily moved from place to place. The fuel tank is mounted on



Four-horsepower type of kerosene oil engine with cylinder head removed

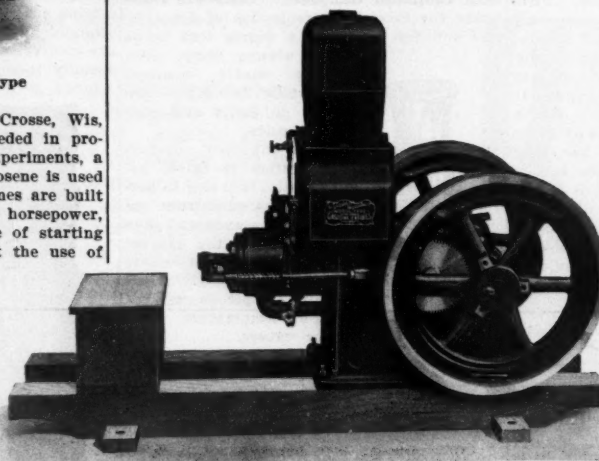
which is so necessary to secure complete combustion, have been successfully overcome and there is therefore no deposit left to carbonize and foul the valves and other working parts, while the danger of explosion that is always



Rear view of 4-horsepower type

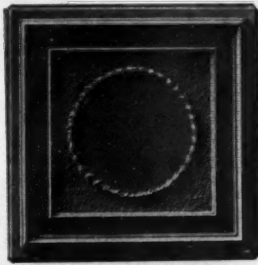
When this does not occur the cylinder remains hermetically closed and the charge is again compressed and re-expanded back of the piston. All these engines are fitted with a high-grade float feed carburetor, the same as in the most expensive automobiles, thus adding much to their reliability. Material of the very best quality is exclusively used in their construction, the finished parts are carefully machined and polished, and the oilers, lubricators, etc., are the finest that can be obtained.

This concern also manufacture an extensive line of stationary, portable and semi-portable upright and horizontal engines designed to use various gaseous fuels, among them natural gas, town gas, gasoline, alcohol, gas oil and crude oil. Catalogues, prices and other particulars will be forwarded to any address upon application.



Side view of 4-horsepower type, showing the method of mounting on skids

present when gasoline is used is entirely eliminated. The company state that these engines develop one horse power per hour from a pint of kerosene, and give as an illustration of their capacity the fact that one of 4-horse power working at a speed of



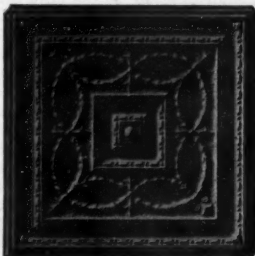
Universal lock joint panel
No. 1033, 2x2 feet

Improved Lock Joint Metal Ceilings

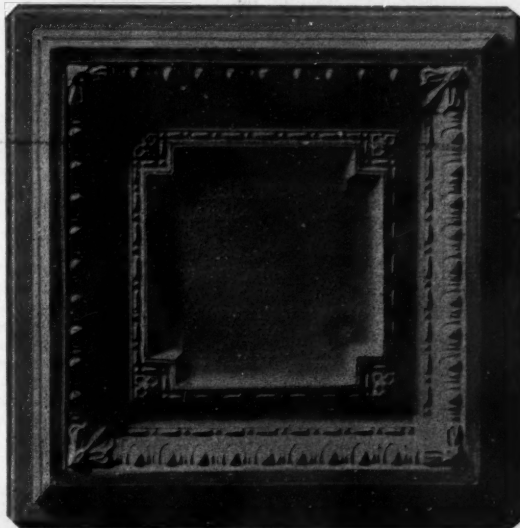
THE many practical advantages to be derived from the use of metal in sheet form for covering ceilings and walls have caused it to be employed to a steadily increasing extent for these purposes. It is durable, sanitary, easily kept clean, impervious to the attacks of insects, rats, mice and other vermin, very moderate in price, and above all, is a great preventative of fire. At first only plain sheets of thin steel were used, but it was not long before manufacturers realized the remarkable opportunity this material offered for producing ceiling and wall coverings that would be attractive in appearance at a cost little greater than that of the plain sheets, and the result was that many of them employed artists of recognized ability to create tasteful designs into which the metal could be stamped. Improvement has come, step by step, until at the present time the use of stamped metal for ceilings and walls is common in all parts of the world. It is easily and quickly erected, extremely attractive and made in so many styles and designs that it makes an effective appeal to anyone who sees it.

The illustrations that accompany this article show examples of Schoedinger's Universal Lock Joint Metal Ceilings, which are claimed to overcome many of the objections that have been made to their general use. These ceilings are manufactured by F. O. Schoedinger, of Columbus, Ohio, U. S. A., who for many years has been well known as a maker of fireproof metal window frames, metal-clad fire doors, metal cornices and skylights, metal roofing of all kinds, ventilators, tinners' and roofers' supplies and other specialties of a similar nature. By means of a very simple process the four sides of every panel of a Schoedinger metal ceiling are provided with an effective lock joint, which not alone conceals all nails and rough edges, but also prevents the point of contact between the different panels from being seen.

Universal lock joint panel
No. 1031, 2x2 feet



Among the other advantages offered by the Schoedinger ceilings are that the lock joint feature makes them absolutely dust-proof and prevents the formation of black streaks at the edges of the panels, as is the case with the ordinary type of lap joint construction. Besides this, the fillers and moldings are all made in combination and are slipped into grooves in the panels all around the room, thereby making the whole ceiling tight and positively free from the unsightly beads, buttons and nail heads, which are so detrimental to the appearance of the average ceiling of this class. The manufacturer of the Universal Lock Joint Metal Ceilings calls especial attention to their raised concealing flange, by means of which the difficulty of attaching them to rough or uneven surfaces is entirely done away with, as it admits of a variation of $\frac{1}{4}$ inch on two sides of each panel. Another point to be considered by a person contemplating the use of a metal ceiling is the fact that the Universal Lock Joint Metal Ceilings require no wood cross-furring or cross-nailing, thus reducing the cost of erection at least 50 per cent. as compared with the old fashioned type of lap joint construction. In addition to this, the moldings and fillers are made with combination lock joints, which afford a saving of about 75 per



Universal lock joint panel No. 1017, 2x2 feet. One
of the most popular designs.

cent. in the cost of erecting those members. These features of economy are pointed to as being distinctive with the Universal Lock Joint Metal Ceilings.

The wonderfully decorative effects that can be obtained by the use of these ceilings peculiarly adapt them for public and semi-public buildings, and many owners of theatres, halls, cafes, stores, etc., have added much to the attractiveness of their premises by installing them. Their light weight is also a great advantage as in single-story buildings much can be saved on account of the possibility of using lighter weight timbers for the roofs than would be necessary if the ceilings were made of plaster or similar heavy substance. In addition to this the annoyance of falling particles or dust, such as is experienced when plaster ceilings are used, is entirely eliminated, which is another item of economy, as when upholstered seats are used in a place of entertainment they are not injured by dust or dirt from this source. The fire resisting qualities of metal ceilings and walls are causing them to be used to a steadily increasing extent in moving picture theatres, owners of which feel much more confident that they are in less danger of fire when they know that the walls and ceilings of their establishments are covered with an absolutely non-inflammable ma-



Universal lock joint panel
No. 1051, 2x2 feet

terial. Besides this they find that the proper protection of their places of entertainment is extremely profitable as they are more liberally patronized when the people know that every precaution possible has been taken to avoid this danger.

So great has been the demand for these ceilings during the past few years that the proprietor has been twice compelled to largely increase the size of the plant within a very short period, and he states that from present indications it will not be long before the process will again have to be repeated. This rapid expansion in demand is claimed to be due entirely to the superior merits of the Universal Lock Joint, as applied to metal ceilings, although the high grade material of which the Schoedinger product is made, the sharp, clear-cut stamping and the many attractive designs available have assisted in no small degree in adding to their popularity.

F. O. Schoedinger has devoted much attention to reducing the manufacturing cost of the Universal Lock Joint Ceilings, so that they could be placed on the market at a price that would enable them to compete with goods of inferior quality, and in pursuance of this object, the latest and most improved machinery has been installed in this concern's extensive factory, much of which was especially designed for this particular plant. All the machines and dies are mechanically accurate and their product is guaranteed by the manufacturer to be without flaw and perfectly uniform in size and material.

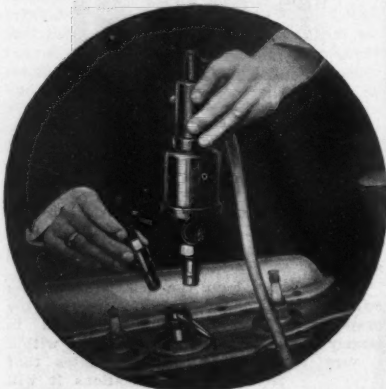
The manufacturer announces that he is offering special agency propositions to responsible persons located in places where he is not at present represented, and would welcome correspondence regarding terms and other particulars. He states that the Improved Ceilings mark a new era in the use of metal ceilings, and that those in a position to handle an article of this nature will find it profitable to communicate with him respecting the offer he makes. All inquiries should be directed to F. O. Schoedinger, Columbus, Ohio, U. S. A., and will be answered without delay.

Universal lock joint panel
No. 1071, 2x2 feet



A Spark Plug Tire Pump

ONE of the most necessary parts of the equipment of an automobile and one that no car owner would think of starting on a trip without is an efficient tire pump. In many instances an ordinary hand pump is considered sufficient, but the tedious, muscle-straining work that is involved in using even



Showing the simple method of attaching the Mayo tire pump

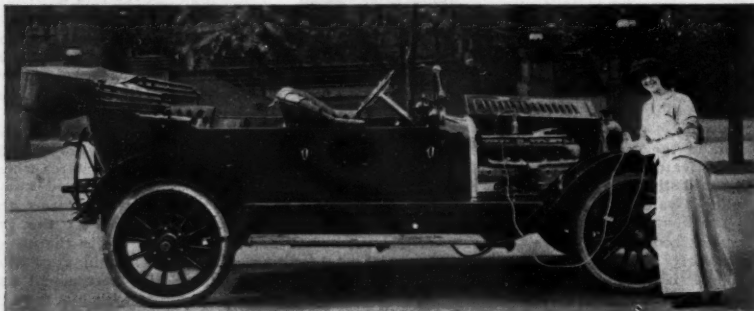
the best of these devices causes many a motorist to defer the proper inflating of his tires when on a journey to their general detriment and frequently severe injury. Many contrivances have been produced with the object of doing this work with the aid of the motor itself and eliminating the labor incidental thereto, and while some of them give very satisfactory service, they are often quite expensive and cannot be attached to every kind of engine.

In this connection the Mayo Manufacturing Company, 54-60 East Eighteenth Street, Chicago, Ill., U. S. A., desire to call attention to their "Mayo Spark Plug Pump," which they claim is an absolutely reliable tire pump that can be instantly attached to any four-cycle motor of two, four or six cylinders, and one that will inflate any tire in from two to

and the construction is simple and mechanically perfect, with no complicated parts to get out of order. It is sold at a very moderate price under an absolute guarantee that it will last as long as the car to which it is attached. For making the pump even more convenient the manufacturers recommend the Mayo Quick Detachable Spark Plug, which can be installed in a motor the same as an ordinary spark plug. One of these pumping outfits consists of a pump with an adapter to fit any car, 12 feet of superior rubber tubing with connections and a thoroughly accurate pressure gauge. The pump is small, light and compact, weighing only 2½ pounds, so that it can be carried with no inconvenience on the lightest cars. Agents and others interested in a moderate-priced practical article that will appeal to every owner of an automobile should write to the manufacturers for terms and literature giving further particulars regarding the merits of this handy little pump, addressing them as above.

A New Adjustable Steel Screw Spanner

THE high quality of many of the iron and steel products of Sweden is so well known that tools and cutlery have always formed a large proportion of the exports from that country. Among the leading Swedish concerns engaged in this line is the firm of B. A. Hjorth & Co., of Stockholm, who for many years have been shipping abroad large quantities of wrenches, spanners, axes, drills, boiler cleaners, shears, cutters and other specialties for tinnerns, etc. This firm state that their different products are now so widely known that few of them call for special mention, and they therefore take this opportunity of calling attention to two novelties which they have recently placed on the market. The first is a screw spanner wrench of entirely new and original design. This tool, which is known as the "Bahco" No. 51-58, can be conveniently held and adjusted with one hand. Owing to the peculiar position of the jaws and the absence of projecting corners this wrench can be used in places inaccessible to ordinary wrenches. The construction is extremely simple and the entire tool is made of the best Swedish steel, insuring ample strength and durability.



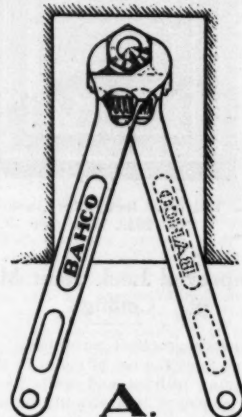
Illustrating the ease of inflating a tire with the Mayo spark plug tire pump when on the road

four minutes, according to size and pressure desired, with the motor itself supplying the power to operate it. The method of attaching this pump to the motor is simplicity itself, the only thing necessary being the removal of the spark plug from one of the cylinders and substituting therefor the pump. After the connection is made the motor is started and run on low throttle until the tire is inflated, the amount of pressure being indicated by a gauge that is furnished with every outfit.

The pump is noiseless in operation, positive in action and requires no attention except an occasional drop of oil. It is designed on a compound principle, which enables the air to be forced under high pressure into the tire,

The second tool is the "Bahco" Patent Universal Pipe Wrench No. 142-146, which is claimed by the manufacturers to be unequalled by any other device of the kind in either design or construction. The new implement is very simple and has no screw connections. All parts are forged of the best Swedish steel, and can be instantly interchanged by a single manipulation without the assistance of a screwdriver or other tool. It can be quickly adjusted with one hand to any size pipe, which it will hold with great tenacity without danger of crushing. The "Bahco" Universal Pipe Wrench can also be used for many other purposes. It will hold work while being drilled; pull nails, even without heads, wedges, etc.; it makes an excellent spanner

and gives perfect service when employed as a wrench for all ordinary purposes. The accompanying illustrations give a very clear idea of the simplicity of these two new tools



Can be used in places inaccessible to ordinary wrenches

and the few parts that enter into their construction. Those desiring to obtain further information regarding these tools, as well as



"Bahco" screw spanner wrench



"Bahco" patent universal pipe wrench

the other specialties manufactured by this concern, should write to the company for catalogues, which will be sent to any address upon request.

Improvements in Instantaneous Photography

THE method of taking photographs of persons or places, that can be finished almost instantaneously in the open air without the assistance of elaborate dark room outfits and delivered with little delay, has, ever since its introduction, occupied a very high position in public favor, and the taking of pictures in various shapes, such as photo buttons, small metallic frames, postal cards, etc., at fairs, conventions, summer resorts, and other places where large numbers of people gather, has become an important and profitable industry. Constant efforts have been made to simplify and improve the apparatus for doing this work, and early in 1913 the International Metal & Ferrotyp Co., of Chicago, Ill., U. S. A., who were among the

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pioneers in this interesting branch of photography, announced the production of a new and original style camera, which was claimed to eliminate practically all the troubles formerly encountered in those of the old fashioned type.

This camera, which is constructed entirely of metal in the form of a field gun, is called



Diamond Post Card Gun Camera with full equipment

by the manufacturers the "Diamond Post Card Gun Camera," and possesses many exclusive features. In the first place it is claimed to be the only practical camera on the market, built entirely of metal, which gives it a marked advantage in the way of durability and ability to withstand rough usage, and in addition to the ever-popular photo buttons it will take four different sizes of postal cards. In fact, it may be called a complete photographic studio in itself, as the pictures are taken direct on the positive paper, without the use of films, plates or dark room, and the picture, clear, sharp and distinct, can be delivered on the spot within 45 seconds.

The body of the gun is made of heavy gauge brass, beautifully finished to take a high nickel polish. The various parts are carefully set and welded together and finished with ornamental bands. The body rests upon an aluminum casting, which is hollow and serves as a magazine for the stock of post cards. The base of this magazine fits over the tripod head, and is fastened securely thereto by a threaded bolt, which can be removed at will. The developing tank, which takes the place of the dark room and hangs below the camera, is divided into two compartments, in each of which five post cards can be placed and developed simultaneously. The manufacturers state that they use only the most improved style lens, the quality being the same as those found in the highest grade field cameras. Another feature worthy of attention is the focusing device, which can be adjusted from 5 to 100 feet, thus making it universal and giving it a perfect range up to 1,000 feet. The shutter is automatic, being equipped with a stop-down diaphragm which enables the operator to time his exposures accurately.

New export connections are being made every day and literature has been prepared in English, Russian, Spanish and German, which will be mailed to any address upon request.

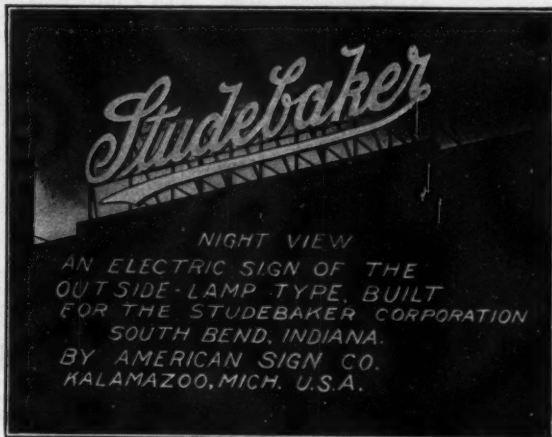
The Increasing Use of Illuminated Signs

ENTERPRISING merchants have always appreciated the value of an attractive sign for calling attention to the nature of their business, but it is only a comparatively few years ago, when the illuminated sign was introduced, that they realized how important a factor it could be made as a means of impressing upon the mind of the public the article they had for sale. At first these signs were crude in design and expensive to operate, but they have been so much improved that their installation and cost for illuminating has become a matter of very moderate expense in comparison with their advertising value.

One of the largest concerns in the world engaged in this line is The American Sign Company, of Kalamazoo, Mich., U. S. A., examples of whose productions can now be seen in almost every civilized country. The signs manufactured comprise an almost endless variety, and it would probably be impossible to imagine any effect that they could not reproduce. Some of the signs sent out from the shops of this company have attracted universal attention, and their brilliant appearance has so quickly convinced merchants of their value as an advertising medium that their adoption is now regarded as a matter of course. Among the effects shown on the

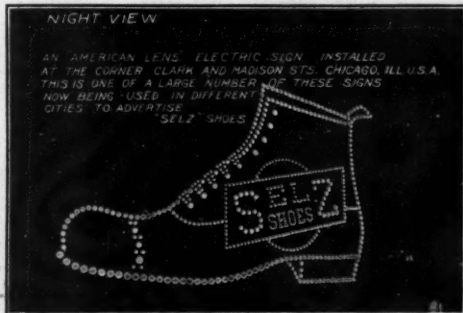
mobile, etc., each of which possesses some particular feature that calls attention to the business of the owner.

Two of the three illustrations given in connection with this article show a day view and a night view of the electric sign "Selz Shoes," and the other a night view of the sign "Studebaker." The Selz Shoe is an excellent example of what can be done with the "American Lens Sign" in the way of construction, outlining, illumination and detail work. In the old style outside lamp type of electric sign it would have been impossible to illuminate and bring out distinctly all the fine details and the whole sign would have been more or less blurred. In the day view



Type of sign that will attract universal attention anywhere, especially at night

of the same sign attention is called to the shading on the painted portion, which shows the fine work that is done in the company's enamelling department, thus enabling a beautiful daylight effect to be obtained as well as wonderful legibility when illuminated. A wide range of color effects is secured by the use of color in the lenses and in the interior lamps. The Selz Shoe shown in these illus-



A wonderfully attractive sign made by the American Sign Company



Effective appearance of the same sign as it appears by day

signs made by the American Sign Company may be mentioned a waving flag, a man walking, a soda fountain with a stream running into a glass, a swimming fish, a moving auto-

trations is eleven feet long, and is installed at the corner of Clark and Madison Streets, Chicago, Ill., the proprietors of which are using similar signs in large quantities for

PIANOS AND PLAYER PIANOS OF SUPERIOR QUALITY

The result of many years of effort and thoroughly tested in all climates

Magnificent Instruments at Fair Prices

Catalogues and further information always at your service

WINTER & CO. SOUTHERN BOULEVARD NEW YORK CITY, U. S. A.

Please mention DUN'S REVIEW when writing to Advertisers, and give ADDRESS IN FULL, including Province and Country.

their retail stores throughout the United States.

The company states that while they make a specialty of the "American Lens" sign, they are prepared to make any and all other kinds, and the "Studebaker" cut shown herewith is an example of the electric sign of the old style type with outside lamps. The steady increase in the demand for the signs made by this company necessitated an extension of manufacturing facilities, and a factory was erected last year which is claimed to have the greatest capacity and the most up-to-date equipment of any establishment of the kind in the world. The company will be pleased to correspond with interested parties and will submit estimates upon request.

European Representation

MANUFACTURERS, exporters and importers who are desirous of forming reliable connections in Belgium and Northern Europe are invited to communicate with Mr. Philippe Berger, Boite Postale No. 20, Charleroi, Belgium. This firm, which was established in 1900, specializes in the handling of industrial products of every description.

Modern Store and Office Fittings

IN recent years more attention than ever before has been paid to the modernizing of business premises and particularly of retail stores of all kinds. For more than half a century Messrs. Frederick Sage & Company, Ltd., of London, have specialized in the designing, manufacture and installation of the interior fittings for business premises of all kinds. Founded in 1860 by the late Frederick Sage, the business developed so rapidly that Mr. F. G. Sage took into partnership Mr. George Sage, the present chairman of the company, in 1883, together with Messrs. Jesse, Frederick and Josiah Hawes. In 1890 the partnership was made a private company and the present company was organized in 1906.

Mr. F. G. Sage and his partners were among the pioneers in the marked development that has taken place in the general fittings and arrangement of modern stores, banks and offices, and demands for the expert services of the firm have been received from every civilized country in the world. Some of the best stores in the United States and South Africa were originally fitted up by this

late King Edward VII. At London examples of the firm's workmanship for mercantile establishments may be found in the magnificently fitted department stores of Messrs. Harrods in Brompton Road, as well as the general planning of Messrs. Whiteley's new stores, while numerous other important installations have been made throughout the United Kingdom.

During the past three or four years the company have executed numerous important works in South America. At Valparaiso they are responsible for the fine new offices of Messrs. Williamson Balfour & Company, Messrs. Anthony Gibbs & Co. and Messrs. Fredk. Huth & Company, as well as the new building and the interior fittings for the London & River Plate Bank. At Concepcion, the firm also installed new offices for Messrs. Williamson Balfour & Co., and at Santiago



Silverware department of Messrs. Harrods, Ltd., London, in fine Cuban mahogany

examples of their work may be seen at the London & River Plate Bank and at the premises of Gath & Chaves. At Buenos Aires, the company are at present engaged in fitting out the new stores for Messrs. Harrods, Ltd. and the South American Stores, while at São Paulo installations have been put in for Messrs. Worms Irmãos, the well known gold and silversmiths, as well as for the Mappin Stores and Messrs. Mappin & Webb, Ltd. At Pernambuco the building of the new London & River Plate Bank is being executed to designs prepared by Messrs. Fredk. Sage & Co.

So important has the Chilean work become that a branch office has now been opened at

St. Andrews University, and lastly, but perhaps the most noteworthy of all, the fittings for the new British and Medieval Antiquities Department of the British Museum.

The operations of the company are upon a scale of completeness and magnitude for which it would be difficult to find an exact parallel.

Firms contemplating the renovation or enlargement of their present premises, or interested in having new premises designed and installed, may obtain illustrated catalogues of the most interesting character by addressing Frederick Sage & Co., Ltd., 58-62 Gray's Inn Road, London, England.

A Leading Belgian Steel Plant

THE Société Anonyme Metallurgique de Sambre & Moselle desire to call the attention of consumers of iron and steel products to their facilities for manufacturing everything in those lines. The plant of this concern, which is located at Montignies-sur-Sambre, near the important industrial city of Charleroi, is among the largest in Belgium, and includes the most modern equipment in the way of coke ovens, blast furnaces, steel works, rolling mills, etc. In addition, the company controls the output of a number of iron mines, and being located in the center of a coal mining district is assured of a plentiful supply of raw material at a moderate cost. No expense has been spared by the company in order to secure the best obtainable in the way of machinery, and the most advanced types of automatic conveyers, transporters, loading and unloading machines have been installed for cheapening the handling of raw material and finished products.

With these facilities and an ample supply of skilled labor the company is in position to compete with concerns of a similar nature in any part of the world, and while already supplying a large demand from abroad, is desirous of further extending its foreign connections. The output of this establishment now amounts to between 28,000 and 30,000 tons of steel per month, including all grades and sizes. Both rounds and squares can be furnished, ranging from 3-16-inch to 8 inches in diameter; flats from 3/4-inch to 6 1/2 feet in width; angles and tees from 1/2-inch up; rails from 6 to 114 pounds per yard; beams from 2 inches to 24 inches in height, etc. Its products also include half-round, convex and



Premises of London & River Plate Bank, Valparaiso, in polished mahogany with marble columns and metal grilles



Street front of "Daily Mail" Bureau at Paris. This, and the two interiors, were designed and executed by Fredk. Sage & Co., Ltd.

company, besides numerous installations that have been carried out throughout Europe and South America. In order to more promptly meet the steadily increasing requirements of their clients abroad branches have been established at Paris, Brussels, Johannesburg, Buenos Aires and Valparaiso, and many fine examples of the company's workmanship can be seen in all of these cities.

In 1901 the firm had the honor of receiving the Royal appointment to fit up the Plate Rooms at Sandringham for His Majesty, the

28, Galeria Comercial, under the superintendence of Mr. Cuthbert H. McDowell, F.R.G.S., whose first assistant is Mr. Hambling, an architect whose pictures have featured in the Architectural Section of the Royal Academy.

The work executed by Messrs. Sage & Co. embraces every department of architectural work and every description of fittings, whether required for banks, offices, shops or museums. Among the latter the company have fitted out the Tring Museum (for the Hon. Walter Rothschild); the museum for the

flat bars for horseshoes, shapes for windows, molded angles and other articles of a similar nature. The company is prepared to grant agencies in cities where it is not at present represented, and solicits correspondence from responsible firms or individuals with this object in view. Those desiring further particulars should write for a catalogue, in which a great number of the products are shown, addressing their letters to Société Anonyme Metallurgique de Sambre & Moselle, Montignies-sur-Sambre, Belgium.

High Grade Footwear for Men and Boys

FOR nearly seventy years the firm of James A. Banister Co., 185-187 Washington Street, Newark, N. J., U.S.A., have specialized in the production of high grade men's and boys' shoes, and their line now includes over 400 distinct and separate styles, made up in every variety of leather and meeting every



A stylish lace shoe for men, made by James A. Banister Co.

requirement of nature and fashion. The company calls attention to the fact that they do not make extremely low-priced goods, their success being based on quality rather than cost, though they claim that the former feature makes them by far the most economical eventually, to say nothing of the satisfaction to be derived from the wearing of fine-appearing, well-fitting and comfortable footwear.

The policy of this concern has always been to obtain the maximum as regards appearance, durability, style and quality, so that

dealers handling their product could confidently say to their customers that the "Banister" shoe or boot was the best that could be obtained. In addition to this, especial attention has always been given to the anatomical features of their products, and while this has enhanced to some extent the cost of manufacturing it has been done because it has been carefully kept in mind that a properly shaped shoe prevents much suffering and discomfort. This is in keeping with the maxim of the firm that "Cheap articles are often the most expensive, and the memory of quality lasts long after the price is forgotten."

Among the most popular styles of Banister shoes may be mentioned the "Chiroplidist," which is made of black kid, with laced upper, and intended for the use of men with soft and tender feet, on account of the flexible and yielding quality of the leather. The "University" is also a laced shoe, but made of gun metal leather; it is very dressy in appearance and is much used by men who are particular as to their appearance. For business wear and for the man who does a great deal of walking the "Pedestrian" is recommended; it is of the Blucher style and made of black willow or tan calf. A favorite model for evening wear is the "Woodward," either button or lace, made in patent leather or velours, and the "Broadway" made of patent colt in either button or lace.

The foregoing represents only a very small proportion of the shoes made by the concern, and those desiring further particulars should communicate with the firm direct. Every shoe leaving the factory is guaranteed to be made of the best materials that can be obtained with the most exacting care by workmen of the greatest skill, and the company points to the fact that these shoes were awarded the highest honors at the international exhibitions at Vienna, 1873; Philadelphia, 1876; New Orleans, 1884-85; Chicago, 1893; Paris, 1900; St. Louis, 1904; and Portland, 1905, as illustrating the estimation

in which they are held by persons qualified to judge.

Catalogues, prices and other particulars will be sent upon request to dealers in high



A "Banister" low cut shoe that is cool and restful

grade men's furnishings, shoes and clothing and merchants generally in any part of the world.

Harness and Leather Specialties

ESTABLISHED over fifty years, the firm of Benjamin Young, of Milwaukee, Wis., U. S. A., has steadily increased its output until a catalogue of more than 700 large pages is required to adequately describe its products. Included therein are a very extensive line of harness, harness parts, saddles, sweat pads, fly nets and leather novelties, among the latter being trunks, bags, suit cases, satchels, straps, etc. In addition to the above, this concern is also a large manufacturer of harnessmakers' supplies and tools, whips, gloves, dog collars, leashes, shaving strops, horse blankets, purses and hand bags, all of which are described in this catalogue. Copies of this large volume will be sent to reliable dealers in any part of the world upon receipt of name and address.



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FOR artistic coloring of hard and soft wood—floors, woodwork and furniture, 17 standard shades, including *Mission*, *Early English*, *Golden Oak*, *Weathered*, *Fumed*, etc. Unsurpassed for staining reed baskets—also burlap and other wall coverings.

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YOU can transform the dirtiest water into bright, clear, sparkling water; you can remove odor or taste, making the water pleasant and safe to drink if you will use a

LOOMIS-MANNING FILTER

The reason why these filters have come to be recognized as the leading filters for use in office buildings, hotels, hospitals, country homes, city homes and all kinds of manufacturing establishments may be stated briefly as follows:

Simple to Operate

The filter is cleansed by reversing the flow of water, which is accomplished by the movement of one lever operating the Manning Single Controlling Valve. This valve makes the care of the filter very simple and makes mistakes impossible.

Effective Results

The filter produces splendid results over long periods of time because the filter bed is kept in good condition by our system of cleansing it. The Loomis Cutting plate through which the bed passes under the action of the washing current breaks up the bed so that every particle is cleansed. The entire bed agitates every time it is washed. All accumulations are driven off through the waste line and the sight glass into any convenient sewer or drain.

Durable Construction

Only materials which will withstand the corrosive action of water to the highest degree are used in the construction of this filter. The outside casing is cast iron, the Manning Single Controlling Valve is solid bronze, the screens are tinned copper, pipe work is either galvanized iron or brass as desired.

They Filter All the Water

The entire water supply entering a building or residence, the water used in manufacturing, for bottling purposes or for boiler use can be made bright, clear and attractive. The filter is attached to the main supply pipe so that every drop of water passes through it. Full instructions for connecting up and for operating are sent with each filter.

The filters are built in many different sizes, styles and capacities. Inquirers should state the quantity of water desired to be filtered per minute or per hour, the condition of the water to be filtered, the pressure available, and the size of their supply pipe.

Loomis-Manning Filter Mfg. Co.

131 South 16th Street

Philadelphia, Pennsylvania, U. S. A.

Cable Address: LOOMISMAN, W. U. T. Code

Threshing Machinery Catalogue

THE Avery Company, of Peoria, Ill., U. S. A., announce that they have now ready for distribution a new catalogue describing their extensive line of threshing machinery, gasoline and steam engines and other implements for use on the farm. The catalogue is very copiously illustrated and, besides specifications of the products of this company, also includes in its contents the experience of many persons who have used the machinery described. Those desiring copies of this interesting pamphlet can obtain the same from the company without charge, by sending their names to the above address.

A Handsome Shoe Catalogue

EVERY dealer in footwear, no matter where located, should lose no time in sending for a copy of the handsome new catalogue describing the "Star" brand of shoes manufactured by Roberts, Johnson & Rand, of St. Louis, Mo., U. S. A., who are one of the leading houses in this line in the United States. The catalogue is printed in colors, so that the appearance of a very wide assortment of shoes is attractively shown. The company makes over 700 different styles, many of which are included in this catalogue, among them being ladies', men's and children's shoes, in high and low cuts, and made in gun metal, patent, tans of various shades, calf, cloth, etc., as well as many specialties in the way of infants' shoes, shoes with rubber soles, tennis and gymnasium shoes. Every dealer who wants to know about the styles that will prevail in fine footwear during the coming fall and winter should write for a copy of this catalogue, one of which will be sent by the company to any address upon request.

Pianos and Player Pianos for Export

FOR many years the policy of the firm of Jacob Doll & Sons, 98-116 Southern Boulevard, New York City, U. S. A., has been to personally supervise the manufacture of their pianos. In consequence of this plan, they have been better able to cope with the problem of embodying the finest material and high-grade workmanship in their product, without making the price prohibitive. They are now marketing instruments which they highly commend as to excellence of tone and quality, and which they state are at the same time well within the means of the average piano buyer.

An idea of the handsome appearance and finish of these instruments can be obtained from the accompanying illustrations, which show two of Doll & Sons' popular models of player pianos. In each

the latest improvements in the manufacture and designing of instruments of this type are embodied. Its simplicity of construction and the ease of access to all its parts, as well as its perfect means of regulation, are among the many commendable features of the instrument. The case is made of highly polished, double veneered mahogany, while the back, made with a view of adding great strength, is constructed of extra heavy hardwood, which serves to diminish the danger of injury by the jarring that usually occurs when moving. The action is thoroughly adjusted in every detail so that there is a prompt response to every demand of the performer.

The firm direct particular attention to their electro-pneumatic pianos designed to operate by electric motive power. These instruments are constructed with a coin slot attachment and are very popular for hotels, restaurants, cafés, skating rinks, dancing academies, etc. They are designed to accommodate direct and alternating current connections of different voltages. A special flute-violin attachment is



Player piano Style No. 55, manufactured by Jacob Doll & Sons, Inc.—can be had with electric motor

furnished in connection with these instruments. It consists of a set of organ pipes so attuned in the different registers that, when operated in conjunction with the piano action, musical effects similar to those of the flute and violin are produced. One of these instruments, which are sold under the trade name of "Electrovas," is illustrated herewith.

A variety of designs and styles of upright and grand pianos suitable for use in every part of the world are manufactured in this factory, and the firm will mail literature containing illustrations, etc., upon request.



"Electrova" Style No. 66, a coin operated attachment 88-note player piano with electro-pneumatic action

Improved Folding Chairs and Camp Stools

THE illustrations that accompany this article show three of the specialties made by the McKinnon Dash Company, of Buffalo, N. Y., U. S. A. No. 1 is a folding chair of im-

a very ingenious seat intended for use in skiffs, canoes, rowboats or other small craft.

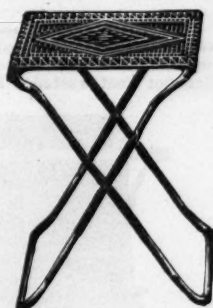
A special feature of these articles is the fact that they are made of selected steel rods, with all parts electrically welded together, thus eliminating all bolts, nuts, screws and rivets, except at the joints where they are unavoidable, and rendering them extremely strong and durable. The folding chairs are made in four sizes, ranging from the small child's size, with a

halls, churches, etc., as the heavy material of which it is constructed enables it to better withstand the rough usage that chairs of this kind are subjected to. They are noiseless, stack up well, do not stick and are not affected by changes in weather conditions. The camp stools are attractive in appearance and very moderate in price, and being light in weight are easy to carry from place to place. The boat seats add comfort and style to any boat or canoe in which they may be used, and as they take up very little room can be easily stowed away in even the smallest craft.

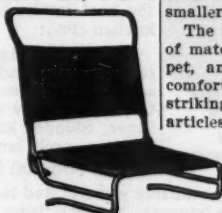
The seats and backs are made in a variety of materials, including duck, leather and carpet, and as both are carefully padded, the comfort they afford to the occupant is in striking contrast to that offered by other articles of a similar nature, this being a



Folding chair



Camp stool



Boat seat open



Boat seat folded

proved design, having a strong metallic frame and a substantial back and seat made of heavy canvas; No. 2 is an ordinary camp stool, also with a metal frame, while No. 3 is

seat 9x9 3/4 inches and 11 inches high, to feature that adds considerable to the grow-

ing popularity of the McKinnon products. Anyone interested can obtain further particulars by writing for a catalogue.

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THE MOTOR WITH POWER TO SPARE

4 Cylinder, 4 Cycle Marine Motor

Models: C—4 1-16 in. x 4 1/2 in., 390 lbs., 24-32 H. P., Price \$250. F—4 1-16 in. x 5 in., 396 lbs., 28-36 H. P., Price \$275. B—4 1/2 in. x 5 in., 475 lbs., 32-40 H. P., Price \$350

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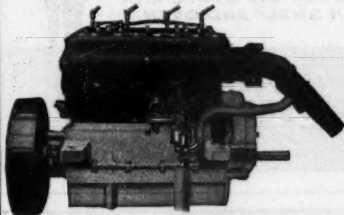
And so, having perfected the "Thorobred" in every other way, we are now bringing out the Red Wing Kerosene Burning Attachment, supplied with all three models, by means of which the "Thorobred" operates at full efficiency on Kerosene Oil. Extra for Models C and F, \$20. For Model B, \$25. Ask for complete information on the model best suited to your needs.

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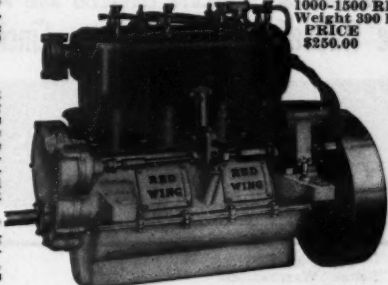
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Red Wing, Minn., U. S. A.

Cable address: "REDMO" Red Wing. Codes: Western Union, A B C Fifth Edition and Private Code.



Arranged for Kerosene Burning



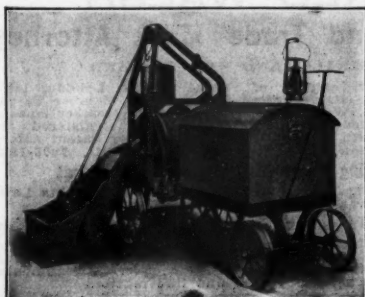
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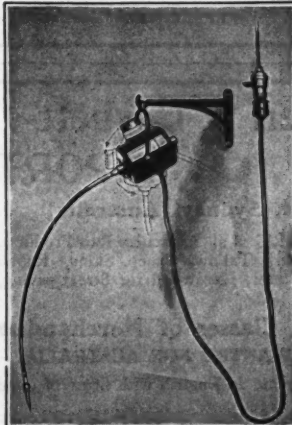
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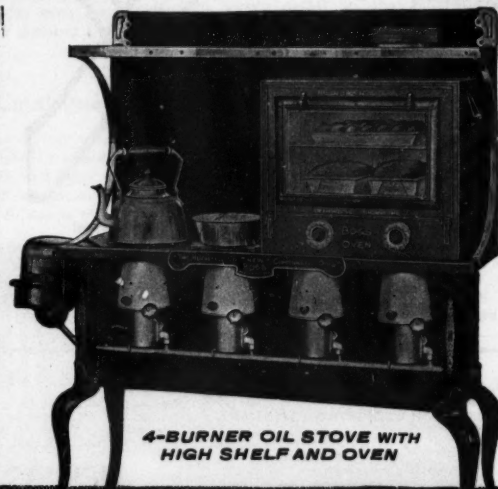
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